

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Renata Pasqualini

Wadih Arap

Serial No.: 10/824,627

Filed: April 14, 2004

For: METHODS FOR EX VIVO  
HYBRIDOMA-FREE PRODUCTION OF  
POLYCLONAL AND MONOCLONAL  
ANTIBODIES AND GENERATION OF  
IMMORTALIZED CELL POPULATIONS

Group Art Unit: 1633

Examiner: Ileana Popa

Atty. Dkt. No.: UTSC:858US

Confirmation No.: 6275

**DECLARATION OF RENATA PASQUALINI AND WADIH ARAP**

I, Renata Pasqualini and Wadih Arap, hereby declare as follows:

1. We are joint inventors of the subject matter of the referenced application. We are currently employed by The University of Texas M. D. Anderson Cancer Center as Professors of Medicine and Cancer Biology. We have substantial experience in the subject matter of the application, as evidenced by our *curriculum vitae*s, copies of which are attached (Exhibit 1).

2. We are giving this declaration to provide evidence that the invention disclosed and claimed in the subject application would not have been obvious to a person of ordinary skill in the art in that such a person would have had no reasonable expectation, *a priori*, that immortalization of splenocytes obtained from mice having the genetic components for human antibody production as well as the genetic components for immortalizing cells would actually be successful.

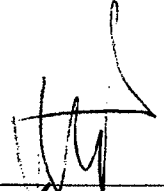
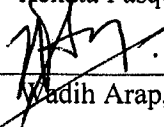
3. A preferred aspect of the invention involves the use of a mouse whose genome includes the genetic components for human antibody production as well as the genetic components for immortalizing cells, such as the temperature-sensitive SV40 Large Tumor antigen (tsSV40Tag). In order to maintain cells from such a mouse in a conditionally "immortal" state, it is required to maintain them at a lower temperature, such as around 33° C. It is not at all a given that the proliferation rates among spleen-derived cells from such a mouse, upon plating at 33° C would allow for the successful expansion and selection of monoclonal splenocyte lines that secrete antibodies or interest at sufficient amounts. The spleen is a complex organ, which contains several cell types, including macrophages, fibroblasts, splenocytes, endothelial and stromal cells, T and B cells. Fibroblasts are well known to be among the most significant impediment for the establishment of primary cell lines, if they are present in a certain preparation that is plated under tissue culture conditions, in that they tend to take over the culture. Moreover, just among the antibody-secreting and non-secreting splenocytes derived from an H-2K<sup>b</sup>-tsA58 transgenic mouse the expected outcome is that the non-secreting cells would grow much faster and take over the culture, preventing the growth of the secreting lines. Indeed, this very point was raised by a scientific referee (a member of the United States National Academy of Sciences and an editor of the *Proc. Natl. Acad. Sci. USA*) who evaluated our manuscript that describes our invention ("Hybridoma-free generation of monoclonal antibodies," *Proc. Natl. Acad. Sci. USA*, 101:257-259, 2004; Exhibit 2). A copy of the referee's comments are attached as Exhibit 3.

4. In support of this notion, one must emphasize that conventional hybridoma production is quite problematic because in a random admixture of clones, non-secreting clones will overtake the antibody-secreting ones. This occurs since different proliferation rates that tend

are slower in the antibody-secreting ones. As further pointed out by the referee, it was expected that, even if obtained, the cloning of monoclonal lines representing antibody-secreting cells would not be possible due to their rarity and inability to grow within the constraints of limiting dilution. Surprisingly, this turned out not to be the case as well, given that the tsSV40Tag spleen cell mixtures were found to provide an ideal system for single cell cloning, due to the presence of other immortalized cells (such as macrophages, stromal cells, and endothelial cells, among others) that apparently serve as an intricate feeder layer. Thus, one of ordinary skill in the art, as perhaps exemplified by the referee, would not have had an expectation to believe *a priori* that immortalization of splenocytes obtained from back-crossings of H-2K<sup>b</sup>-tsA58 mice and transgenic mice containing a replaced genetic complement for human antibody production would actually be successful. Indeed, as can be seen from Exhibit 3, the National Academy referee specifically stated that our achievement was considered surprising.

5. We hereby declare that all statements made herein of our knowledge are true, and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the referenced patent application or any patent issued thereon.

9/18/2007  
Date  
9/18/2007  
Date

  
Renata Pasqualini, Ph.D.  
  
Wadih Arap, M.D., Ph.D.

## **Exhibit 1**

## **CURRICULUM VITAE**

### **NAME**

Wadih Arap, M.D., Ph.D.

### **PRESENT TITLE AND AFFILIATION**

#### **Primary Appointment**

Deputy Chairman and Professor of Medicine, Department of Genitourinary Medical Oncology  
Hubert L. and Olive Stringer Professorship for Cancer Treatment and Research  
The University of Texas M. D. Anderson Cancer Center, Houston, Texas

Attending Physician, Department of Genitourinary Medical Oncology  
The University of Texas M. D. Anderson Cancer Center, Houston, Texas

#### **Dual/Joint Appointment**

Professor of Cancer Biology, Department of Cancer Biology  
The University of Texas M. D. Anderson Cancer Center, Houston, Texas

### **CITIZENSHIP AND VISA STATUS**

Brazilian, Italian, American

### **HOME ADDRESS**

1914 West Gray Avenue #308  
Houston, TX 77019  
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### **OFFICE ADDRESS**

The University of Texas M.D. Anderson Cancer Center  
Department of Genitourinary Medical Oncology  
1515 Holcombe Boulevard, Room T7.3988, Unit 1374  
P.O. Box 301439  
Houston, TX 77230-1439  
Voice Mail: (713) 792-3871  
Office: (713) 794-1348/(713) 792-3873  
FAX: (713) 745-2999  
E-mail: [warap@mdanderson.org](mailto:warap@mdanderson.org)

### **WEBSITE**

<http://www.mdanderson.org/labs/arap>

### **EDUCATION**

#### **Degree-Granting Education**

University of São Paulo Medical School, São Paulo, Brazil, M.D., 1978-1983

Stanford University, Cancer Biology Program, Stanford, CA, and Ludwig Institute for Cancer Research, La Jolla, CA, Ph.D. in Cancer Biology, 1991-1996 (Advisor: Dr. Webster K. Cavenee)

#### **Postgraduate Training**

Internal Medicine Resident, PGY1-PGY3, University Hospitals, University of São Paulo Medical School, São Paulo, Brazil, 1984-1986

Medical Oncology and Hematology Fellow, PGY4-PGY7, Memorial Hospital, Memorial Sloan-Kettering Cancer Center, New York, NY, 1987-1991

Postdoctoral Associate, The Burnham Institute, La Jolla, CA, 1997-1998

## **CREDENTIALS**

### **Board Certification**

#### **Licensure(s)**

##### **Active**

Connecticut, #031815, current through 09/30/07

Texas, #K9216, current through 02/28/08

##### **Inactive**

New York, #P22038, 1987-1991

São Paulo, Brazil, #48534, current through 01/01/06

## **EXPERIENCE/ SERVICE**

### **Academic Appointments**

Associate Professor, Department of Genitourinary Medical Oncology

The University of Texas M. D. Anderson Cancer Center, Houston, Texas, 1999-2003

Staff Scientist, The Burnham Institute, La Jolla, CA, 1998-1999

### **Academic Administrative Appointments/Responsibilities**

Translational Research Coordinator, Genitourinary Cancer Center, The University of Texas M. D. Anderson Cancer Center, Houston, Texas, 2004 – Present

### **Institutional Committee Activities**

Member, Sciences, Virology and Gene Therapy Program, 2000 – Present

Member, Clinical Research Committee, 2000 – 2002

Member, Committee for the Review of The University of Texas M. D. Anderson Cancer Center Prostate Cancer SPORE Pilot Projects, 2001 – Present

Member, The University of Texas M. D. Anderson Cancer Center Prostate Cancer SPORE Executive Committee, 2001 – Present

Member, Technology Review Committee, 2002 – 2003

Member, The University of Texas M. D. Anderson Cancer Center Prostate Cancer SPORE External Advisory Committee, 2002 – Present

Member, Tissue Acquisition Committee, 2003 – Present

Member, Translational Faculty Development Committee, 2004 – Present

Member, The University of Texas M. D. Anderson Cancer Center Institutional Review Board II, 2004 – 2005

Member, The University of Texas Graduate School of Biomedical Sciences at Houston Committee, 2004 – Present

Member, The University of Texas M. D. Anderson Cancer Center Conflict of Interest Committee (COIC), 2004 – 2009

Member, The University of Texas Extramural Programs Committee, 2004

Member, Basic Sciences Research Symposium Planning Committee Meeting, 2004 – 2005

Member, Physician-Scientist Committee, 2004 – 2005

Member, Institutional Research Grants (IRG) Program, Study Section Committee for Clinical, Translational, and Population-based Projects, 2004 – Present

Member, Program Internal Advisory Committee (PIAC), 2004 – 2005

Member, M. D. Anderson Cancer Center, Sister Institution Conference, South America Partnership Meeting Organizing Committee, 2005 - 2006

Member, M. D. Anderson Cancer Center Search Committee for EVP and Chief Academic Officer, 2006

Member, External Advisory Committee, The Hospital do Cancer A C Camargo (HCACC), 2006-2008

Member, Multidisciplinary Research Advisory Committee, 2006 – Present

Host to Italian Consulate, Dr. Cristiano Maggipinto, 05/07

Host to Brazilian Consulate, Carlos Alberto de Azevedo Pimentel, Diplomat, 06/07

#### **Other Appointments/Responsibilities**

##### **Media/Communications Activities**

###### **Television**

NBC Nightly news, KPRC-TV, Ch. 2. A story on M. D. Anderson's resurgence and rapid rise in patient growth. This story, which came as a direct result of the recent page-one Wall-Street Journal story, 2000.

CNN shooting with Dr. Mendelsohn, 2001.

Worked with PBS "NOVA" on an hour-long special on anti-angiogenesis and other new therapies, 2001.

7 News Boston, Diet Discovery,  
<http://www1.whdh.com/features/articles/healthcast/DBM203/>, 05/10/04.

ABC 13 Eyewitness News, Cancer research uncovers shot that could melt fat away,  
[http://abclocal.go.com/ktrk/health/051004\\_health\\_fatcells.html](http://abclocal.go.com/ktrk/health/051004_health_fatcells.html), 05/10/04.

NBC, Study: Weight-loss drug cuts fat tissues' blood supply in mice,  
<http://www.nbc5i.com/health/3288686/detail.html>, 05/10/04.

News 10, Fat Cells, <http://www.news10.com/Global/story.asp?S=1862161>, 05/12/04.

## Print

### National

New York Times, Patent Report, Method of Identifying molecules that home to a selected organ in vivo, 1996.

Business Week, Protein tags chase down tumors, 1996.

San Diego Tribune, Researchers report gains in molecular tag study, 1996.

S. Komen Press Release, The Susan G. Komen Breast Cancer Foundation Announces 1998 Postdoctoral Fellowship Grantees, 1998.

Appeared on the cover of M. D. Anderson's "Research Milestones" brochure, 2001.

Urology Times, Molecular 'map' will allow study of tissue markers: urothelial address mapping will enable targeted imaging, diagnosis, and therapy, 2001.

The New York Times Company, Science Times, How cells know where to exit the bloodstream to go to work, 2002.

Science Magazine, Biomedical Ethics: Study of brain dead sparks debate,  
<http://www.sciencemag.org/cgi/content/full/295/5558/1210>, 02/15/02.

News Release, M. D. Anderson researchers map "zip codes" in the human blood vessel system, 01/31/02.

ScienceNow, A new angle on targeted drug design,  
<http://sciencenow.sciencemag.org/cgi/content/full/2002/204/1>, 02/04/02.

Texas Medical Center News, Researchers identify "zip codes" in the human blood vessel system, [http://www.tmc.edu/tmcnews/02\\_15\\_02/page\\_15.html](http://www.tmc.edu/tmcnews/02_15_02/page_15.html), 02/15/02.

CancerWise, A publication of M. D. Anderson Cancer Center, Researchers Map "Zip Codes" in the human blood vessel system,  
[http://www.cancerwise.org/March\\_2002/print.cfm?id=E552EEEE-1357-47F9-B72DF4690515B2C5&method=DisplayFull](http://www.cancerwise.org/March_2002/print.cfm?id=E552EEEE-1357-47F9-B72DF4690515B2C5&method=DisplayFull), 03/02.

Doctor, doctor. Network, A Publication of the Anderson Network, 2002.

Chicago Tribune, Science seeks secrets of life in brain-dead, 2003.

Nature Biotechnology, Press Release, Zeroing in on cancer markers, 2003.

Emory Report, Bioethicist writes terminal-care research guidelines, 2003.

Genomics & Proteomics, Feature Article, With automated throughput, this robust technique finds utility from cancer research to biological agent detection, 2003.

Oncolog, A publication of M. D. Anderson Cancer Center, Proteomics may revolutionize cancer detection, staging, and prognosis,  
<http://www2.mdanderson.org/depts/oncolog/pdfs-issues/03/oncolog5-03.pdf>, 05/03.

The Wall Street Journal, A new tactic against obesity: Starve fat cells of blood supply,  
<http://www.unh.edu/journalism/fatcells.htm>, 05/10/04.



U.S. News and World Report, Science calls at the deathbed,  
<http://www.usnews.com/usnews/health/articles/040112/12dead.htm>, 01/12/04.

U.S. News & World Report, Cancer's fearsome travelers,  
<http://www.usnews.com/usnews/health/articles/040405/5cancer.b.htm>, 04/05/04.

Chemical & Engineering News, Chemical Highlights 2004,  
<http://pubs.acs.org/cen/coverstory/8251/8251chemistry.html>, 12/20/04.

The Boston Globe, Molecule found to trim fat in mice,  
[http://www.boston.com/yourlife/health/diseases/articles/2004/05/10/molecule\\_found\\_to\\_trim\\_fat\\_in\\_mice/](http://www.boston.com/yourlife/health/diseases/articles/2004/05/10/molecule_found_to_trim_fat_in_mice/), 05/10/04.

Nature Medicine, Magic bullets melt fat,  
<http://www.nature.com/nm/journal/v10/n6/full/nm0604-581.html>, 06/04.

Fat Mice News Release, Obesity reversed in mice by destroying blood vessels that service fat cells, 2004.

News & Views Nature Medicine 10, 581-582, Targeted ablation of the vasculature that feeds adipose tissue causes weight loss in mice, 2004.

Science in the News, Weekly, Anti-cancer technique may prove effective against fat, 2004.

NCI Score Report, Using vascular zip codes to aim at prostate tumors, 02/04.

Oncolog, A publication of M. D. Anderson Cancer Center, Translational research speeds the journey from lab results to clinical outcomes,  
<http://www2.mdanderson.org/depts/oncolog/articles/pf/04/3-mar/3-04-1-pf.html>, 03/04.

M. D. Anderson Cancer Center, News Release, Obesity reversed in mice by destroying blood vessels that service fat cells,  
<http://www.mdanderson.org/departments/newsroom/display.cfm?id=BCD494D1-3EBE-4D9E-945AD3CCFF7E0562&method=displayFull&pn=00c8a30f-c468-11d4-80fb00508b603a14>, 05/09/04.

Arizona Daily Star, Treatment for cancer could rid bodies of fat,  
<http://www.azstarnet.com/dailystar/relatedarticles/21434.php>, 05/10/04.

The Philadelphia Inquirer, New way to fight fat shows promise,  
<http://www.timesleader.com/mld/inquirer/living/health/8629242.htm>, 05/10/04.

Science Daily, Obesity reversed in mice by destroying blood vessels that service fat cells, 05/10/04.

Science in the News Weekly, Anti-cancer technique may prove effective against fat,  
<http://www.americanscientist.org/template/Newsletter?memberid=null&issueid=2921>, 05/11/04.

The Christian Post, Early stage anti-obesity drug shows promise,  
<http://www.christianpost.com/article/technology/91/early.stage.anti-obesity.drug.shows.promise/1.htm>, 05/12/04.

Chemical & Engineering News, Starving Fat,  
<http://pubs.acs.org/cen/news/8220/8220notw1.html>, 05/17/04.

FYI, A publication of M. D. Anderson Cancer Center, Obesity reversed in mice by destroying blood vessels that service fat cells,  
[www.mdanderson.org/pdf/fyi\\_05242004.pdf](http://www.mdanderson.org/pdf/fyi_05242004.pdf), 05/24/04.

Milwaukee Journal Sentinel, Team shrinks mice fat cells,  
<http://www.jsonline.com/alive/news/may04/231327.asp>, 05/24/04.

Lab Animal, Fat mice undergo 'molecular liposuction',  
<http://www.labanimal.com/labanimal/journal/v33/n7/full/labanimal0704-8c.html>, July/August 2004.

Inside M. D. Anderson - Messenger, Starving fat cells to fight obesity, published by the University of Texas M. D. Anderson Cancer Center,  
[http://inside.mdanderson.org/publications/messenger/July-August\\_2004/display.cfm?id=EAFE5A21-1933-4417-B7B9598F48B35230&method=displayFull](http://inside.mdanderson.org/publications/messenger/July-August_2004/display.cfm?id=EAFE5A21-1933-4417-B7B9598F48B35230&method=displayFull), July/August 2004.

GRP78 Press Release, Targeting stress response proteins on breast, prostate tumor cells shows promise, 09/20/04.

Johns Hopkins Medical Institution, \$10 million awarded to Johns Hopkins for studies of breast cancer spread,  
[www.hopkinsmedicine.org/breastcenter/documents/DoD\\_grant.pdf](http://www.hopkinsmedicine.org/breastcenter/documents/DoD_grant.pdf), 10/07/04.

Science News, Notes, Virus has the Midas touch, 2006.

NanoBiotechnology News, Viral, gold nanoparticles can assemble themselves to potentially find and treat disease, 2006.

Biophotonics, Adding gold to phage provides solid foundation for biosensors, 2006.

[http://www.livescience.com/humanbiology/060324\\_nanoshuttles.html](http://www.livescience.com/humanbiology/060324_nanoshuttles.html)

Fox News, Drug Nanoshuttles to Target Specific Parts of Human Body,  
<http://www.foxnews.com/story/0,2933,189036,00.html>, 03/27/06.

Houston Chronicle, Hybrid virus may help fight cancer, April 22, 2006.

ASBMB Today, New Hybrid Virus Provides Targeted Molecular Imaging of Cancer,  
[http://www.asbmb.org/asbmb/site.nsf/web/C3AA293D132C401F85257181004CF50D/\\$FILE/ASBMBToday-2006-6.pdf](http://www.asbmb.org/asbmb/site.nsf/web/C3AA293D132C401F85257181004CF50D/$FILE/ASBMBToday-2006-6.pdf), 06/06.

OncoLog News Brief, Targeting Molecular Imaging of Cancer,  
<http://www2.mdanderson.org/depts/oncolog>, 06/06.

## International

Newscientist, A new drug pins down tumours... then throttles them,  
<http://www.newscientist.com/article.ns?id=mg16321983.200>, 07/08/99.

Focus Das Moderne Nachrichtenmagazin, Forschung & Technik, Experiment im Sterben,  
Focus 8:128, 2002.

The Daily Mail, The flab dissolver; New drug is 'liposuction without surgery' say experts  
after trials show it can reduce body weight by a third,  
<http://www.highbeam.com/library/doc0.asp?docid=1G1:116421454>, 05/10/04.

Newscientist, Molecule cuts off fat's food supply,  
<http://newscientist.com/article.ns?id=dn4974>, 05/10/04.

International Healthcare Journal, Tackling obesity,  
[www.voyageur.co.uk/ihj/pdf/ihj\\_proof06.pdf](http://www.voyageur.co.uk/ihj/pdf/ihj_proof06.pdf), 06/04.

Scientific American Brasil, Terapia anticancer da origem a droga que destroi gordura,  
[http://www2.uol.com.br/sciam/conteudo/noticia/noticia\\_66.html](http://www2.uol.com.br/sciam/conteudo/noticia/noticia_66.html), 2004.

Textbook in Biology and Chemistry, Danish University of Pharmaceutical Sciences, Ed.  
Jasper Munck, 2005 (in Danish).

Folha de São Paulo, Ciencia, Brasileiro faz mistura capaz de achar célula doente no  
corpo, Banho de ouro cria vírus preciosos, 2006.

ISTOÉ, Ciencia, O vírus de ouro, 2006.

**Web only**  
**National**

The Burnham Institute, Scientists use cellular "area codes" to deliver cancer drug with reduced side effects, <http://www.burnham.org/NewsAndInformation/News/1-16-1998.asp>, 01/16/98.

The Burnham Institute, Target, pro-apoptotic peptides: A potential new class of anti-cancer agents, a practical solution to angiogenesis, <http://www.burnham.org/NewsAndInformation/News/9-10-1999.asp>, 09/10/99.

Hospital Practice, Neurodegenerative Disease and cancer: two sides of a coin? <http://www.hosppract.com/issues/2001/09/bred.htm>, 09/01.

Genome Biology, Vasculature mapping, [http://genomebiology.com/researchnews/default.asp?arx\\_id=gb-spotlight-20020213-02](http://genomebiology.com/researchnews/default.asp?arx_id=gb-spotlight-20020213-02), 02/13/02.

Science Blog, Novel Approach shows promise for a blood test, <http://www.scienceblog.com/community/older/2002/B/20026718.html>, 12/02.

Prostate Cancer Week, Study: Blood test may help evaluate prostate cancer disease progression, <http://www.prostatecancerweek.org/members/vol3/News/030102.htm>, 01/05/03.

MSNBC, New cancer technique useful against fat? <http://msnbc.msn.com/id/4939358>, 05/10/04.

Bio.com, Obesity reversed in mice by destroying blood vessels that service fat cells, [http://www.bio.com/newsfeatures/newsfeatures\\_research.jhtml?cid=700040](http://www.bio.com/newsfeatures/newsfeatures_research.jhtml?cid=700040), 05/10/04.

Science Now, Hunting down cancer, <http://sciencenow.sciencemag.org/cgi/content/full/2004/923/4>, 09/23/04.

Medical News Today, New wonder drug starves fat and makes you lose 30% of your body weight, <http://www.medicalnewstoday.com/index.php?newsid=8172>, 05/11/04.

College of American Pathologists, Swinging for the fences with prostate cancer tissue bank, [http://www.cap.org/apps/docs/cap\\_today/feature\\_stories/0204Prostate.html](http://www.cap.org/apps/docs/cap_today/feature_stories/0204Prostate.html), 02/04.

DrugResearcher.com, peptide blasts fat cells in obese mice, <http://www.drugresearcher.com/news/news-NG.asp?n=52542-peptide-blasts-fat>, 02/06/04.

Washington University School of Medicine in St. Louis, Cancer's fearsome travelers, <http://wuphysicians.wustl.edu/newsArchive.asp?navID=&ID=413>, 04/05/04.

EurekAlert, Obesity reversed in mice by destroying blood vessels that service fat cells, [http://www.eurekalert.org/pub\\_releases/2004-05/uotm-ori050704.php](http://www.eurekalert.org/pub_releases/2004-05/uotm-ori050704.php), 05/09/04.

Signonsandiego, Molecule 'vacuums up' fat from mice – U.S. study, <http://www.signonsandiego.com/news/health/20040509-0700-science-fat.html>, 05/09/04.

Americans for Medical Progress, Obesity reversed in mice by destroying blood vessels that service fat cells, <http://www.amprogress.org/News/News.cfm?ID=615&c=62>, 05/10/04.

BrightSurf.com, Obesity reversed in mice by destroying blood vessels that service fat cells, [http://www.brightsurf.com/news/may\\_04/EDU\\_news\\_051004.php](http://www.brightsurf.com/news/may_04/EDU_news_051004.php), 05/10/04.

CV News, Novel peptide treatment reverses obesity in mice, <http://www.crestor.info/index.asp?did=3441&aid=32189&l1=6&l2=0&ch=CV+News>, 05/10/04.

Guardian Unlimited, Want to be slim? Cut your blood supply, [http://www.tmc.edu/tmcnews/02\\_15\\_02/page\\_15.html](http://www.tmc.edu/tmcnews/02_15_02/page_15.html), 05/10/04.

HealthNews, Obesity reversed in mice by destroying blood vessels that service fat cells, <http://www.healthnews.ws/index.aspx?id=2214>, 05/10/04.

The Mail Online, 'Fat-zapping' drug could combat obesity, [http://www.mailonsunday.co.uk/pages/live/articles/health/dietfitness.html?in\\_article\\_id=301308&in\\_page\\_id=1798](http://www.mailonsunday.co.uk/pages/live/articles/health/dietfitness.html?in_article_id=301308&in_page_id=1798), 05/10/04.

Medi Lexicon, Obesity reversed in mice by destroying blood vessels that service fat cells, <http://www.medilexicon.com/medicalnews/php?language=&newsid=8098>, 05/10/04.

Medical News Today, Obesity reversed in mice by destroying blood vessels that service fat cells, <http://www.medicalnewstoday.com/index.php?newsid=8098>, 05/10/04.

News-Medical.net... Strategy to treat obesity through molecular liposuction, <http://www.news-medical.net/?id=1395>, 05/10/04.

Newswise, Obesity reversed in mice by destroying blood vessels, <http://www.newswise.com/articles/view/504903/>, 05/10/04.

ScientificAmerican.com, Cutting off blood supply to fat cells slims obese mice, <http://www.sciam.com/article.cfm?chanID=sa003&articleID=0007686A-F4AD-109B-B4AD83414B7F0000>, 05/10/04.

Slashdot, Molecule cuts off fat's food supply, <http://science.slashdot.org/article.pl?sid=04/05/11/0022203&threshold=4&mode=nested&commentsort=0>, 05/10/04.

SurgeryNews.net, Blood feud kills off fat cells, <http://www.surgerynews.net/news/0504/fat50404.htm>, 05/10/04.

SurgeryNews.net, Strategy to treat obesity through molecular liposuction, <http://www.surgerynews.net/news/0604/lipo060401.htm>, 05/10/04.

WebMD Health, Obesity treatment makes fat vanish, <http://my.webmd.com/content/article/86/99202.htm?lastselectedgid=%7B5FE84E90-BC77-4056-A91C-9531713CA348%7D>, 05/10/04.

WebMD Medical News, Obesity treatment makes fat vanish, [http://webcenter.health.webmd.netscape.com/content/Article/86/99202.htm?z=1728\\_000\\_00\\_1000\\_nb\\_01](http://webcenter.health.webmd.netscape.com/content/Article/86/99202.htm?z=1728_000_00_1000_nb_01), 05/10/04.

Wired News, Blood feud kills off fat cells, [http://www.wired.com/news/medtech/0%2C1286%2C63388%2C00.html?tw=wn\\_tophead\\_4](http://www.wired.com/news/medtech/0%2C1286%2C63388%2C00.html?tw=wn_tophead_4), 05/10/04.

British Nursing News Online, Want to be slim? Cut your blood supply, [http://www.bnn-online.co.uk/news\\_datesearch.asp?page=4&SearchDate=11/May/2004&Year=2004](http://www.bnn-online.co.uk/news_datesearch.asp?page=4&SearchDate=11/May/2004&Year=2004), 05/10/04.

Better Humans, Starving fat cells could treat obesity drug kills cells that feed fat tissue, <http://www.betterhumans.com/News/news.aspx?articleID=2004-05-11-1>, 05/11/04.

Biological Procedures Online, Obesity reversed in mice by destroying blood vessels that service fat cells, <http://www.biologicalprocedures.com/bpo/general/news/040510/05.htm>, 05/11/04.

Biological Psychology, Mice fight the flab, <http://www.biopsychology.com/index.php?id=Mice+fight+the+flab&x=17&y=10&type=search>, 05/11/04.

Health Central, Liposuction in a pill? [http://www.healthcentral.com/PrinterFriendly\\_hc/drdean/408/60848.html](http://www.healthcentral.com/PrinterFriendly_hc/drdean/408/60848.html), 05/11/04.

Health on the Net, Health highlights, New therapy appears to reverse obesity in mice, <http://www.hon.ch/News/HSN/518885.html>, 05/11/04.

Indiana Organ Donation Organization, Starving fat cells could treat obesity, [http://www.iopo.org/news\\_detail.asp?ID=191](http://www.iopo.org/news_detail.asp?ID=191), 05/11/04.

VIDYYA, Obesity reversed in mice by destroying blood vessels that service fat cells, [http://www.vidyya.com/vol6/v6i131\\_1.htm](http://www.vidyya.com/vol6/v6i131_1.htm), 05/11/04.

True Star Health, Early stage anti-obesity drug shows promise, [http://www.truestarhealth.com/members/cm\\_archives03ML3P1A42.html](http://www.truestarhealth.com/members/cm_archives03ML3P1A42.html), 05/12/04.

Cancer Patients Aid Association, Next era of cancer therapy aims to separate cancer from blood supply, [http://www.cpaaindia.org/infocentre/clipping\\_gen\\_2.htm](http://www.cpaaindia.org/infocentre/clipping_gen_2.htm), 05/16/04.

MedScape, Reversal of obesity by targeted ablation of adipose tissue, <http://www.medscape.com/viewarticle/481335>, 06/24/04.

Coalition for Medical Progress, Deadly accurate cancer missile, [http://www.medicalprogress.org/benefits/breastcan/news.cfm?news\\_id=168](http://www.medicalprogress.org/benefits/breastcan/news.cfm?news_id=168), 08/10/04.

Consulting Room, Obesity reversed in mice by destroying blood vessels that service fat cells, <http://www.consultingroom.com/Aesthetics/news/Display.asp?id=916>, 09/05/04.

Medical News Today, Targeting stress response proteins of breast, prostate tumor cells shows promise, <http://www.medicalnewstoday.com/medicalnews.php?newsid=13738#>, 09/21/04.

News-Medical.net, Stress response proteins offer a promising target for a novel drug guidance system, <http://www.news-medical.net/?id=4951>, 09/21/04.

The Stress of Life.com, Targeting stress response proteins on breast, prostate tumor cells shows promise, <http://thestressoflife.com/date.htm>, 09/27/04.

Clinical Proteomics, \$10M quest for the molecular markers of breast metastasis, <http://proteomics.cprmap.com:8090/forums/showthread.php?t=11591>, 10/08/04.

Johns Hopkins Medicine, \$10 million awarded to Johns Hopkins for studies of breast cancer spread, [http://www.hopkinsmedicine.org/Press\\_releases/2004/10\\_09\\_04.html](http://www.hopkinsmedicine.org/Press_releases/2004/10_09_04.html), 10/08/04.

RT Image, \$10 million awarded for studies of breast cancer spread, <http://www.rt-image.com/content=9004J05C4896B88640569C74448080441>, 10/25/04.

Veritas Medicine for Patients, Update on Obesity: Partial answers to heavy questions, [http://www.veritasmedicine.com/d\\_home.cfm?type=WU&did=6&ml=1](http://www.veritasmedicine.com/d_home.cfm?type=WU&did=6&ml=1), 01/14/05.

PancreasWeb.com, Targeting pancreatic islets with phage display assisted by laser pressure catapult microdissection, 2005.

Ethical frontier: Research on the dead. <http://www.suntimes.com/output/health/cst-nws-deadtests03.html>, 01/06.

Medical News Today, Viral, Gold Nanoparticles Can Assemble Themselves To Potentially Find And Treat Disease, <http://www.medicalnewstoday.com>, 1/06.

Medical News Today, Viral, Gold Nanoparticles Can Assemble Themselves To Potentially Find And Treat Disease, <http://www.medilexicon.com>, 1/06.

Medical News Today, Viral, Gold Nanoparticles Can Assemble Themselves To Potentially Find And Treat Disease, <http://www.hospitalsworldwide.com>, 1/06.

[http://dsc.discovery.com/news/briefs/20060206/nanoshuttle\\_tec.html](http://dsc.discovery.com/news/briefs/20060206/nanoshuttle_tec.html), 1/06.

Newswise, Viral, Gold Nanoparticles Can Assemble Themselves to Find, Treat Disease, <http://www.newswise.com/articles/view/517439/>, 01/20/06.

BIO.COM: Biotechnology & Pharmaceutical News, Viral, Gold Nanoparticles Can Assemble Themselves to Potentially Find and Treat Disease <http://www.bio.com/realm/research.jhtml?realmId=5&cid=16200041>, 01/23/06.

Eurekalert.org, Viral, gold nanoparticles can assemble themselves to potentially find and treat disease, [http://www.eurekalert.org/pub\\_releases/2006-01/uotm-vgn012006.php](http://www.eurekalert.org/pub_releases/2006-01/uotm-vgn012006.php), 01/23/06.

M. D. Anderson Cancer Center, Viral, Gold Nanoparticles Can Assemble Themselves to Potentially Find and Treat Disease, <http://www.mdanderson.org/departments/newsroom/display.cfm?id=8fa45286-2920-464e-9a7fc76cfa93db72&method=displayfull&pn=00c8a30f-c468-11d4-80fb00508b603a14>, 01/23/06.

Nanotechnology.com news, Viral, gold nanoparticles can assemble themselves to potentially find and treat disease, <http://www.nanotechnology.com/news/index.php?search=souza&p=&x=0&y=0>, 01/23/06.

Nanomedicine Literature, Networks of gold nanoparticles and bacteriophage as biological sensors and cell-targeting agents. <http://www.nano-biology.net/showabstract.php?pmid=16434473>, 01/23/06.

RxPG News, Drug Delivery - Using biologically compatible materials to fabricate a nanoshuttle, [http://www.rxpgnews.com/research/biotechnology/drugdelivery/printer\\_3254.shtml](http://www.rxpgnews.com/research/biotechnology/drugdelivery/printer_3254.shtml), 01/24/06.

Whatsnextnetwork.com, What's Next In Health - Viral, Gold Nanoparticles Can Assemble Themselves to Potentially Find and Treat Disease  
<http://www.whatsnextnetwork.com/health/index.php/2006/01/25/p1733>, 01/25/06.

What's Next In Science & Technology, Viral, Gold Nanoparticles Can Assemble Themselves to Potentially Find and Treat Disease,  
[http://www.whatsnextnetwork.com/technology/index.php/2006/01/25/viral\\_gold\\_nanoparticles\\_can\\_assemble\\_th](http://www.whatsnextnetwork.com/technology/index.php/2006/01/25/viral_gold_nanoparticles_can_assemble_th), 01/25/06.

The World Health Network - Anti-Aging and Longevity, Viral, Gold Nanoparticles Can Assemble Themselves to Find, Treat Disease, <http://www.worldhealth.net/p/viral-gold-nanoparticles-can-assemble-themselves-to-find-treat-disease-2006-01-25.html>, 01/25/06.

Nanowork News, Networks of gold nanoparticles and bacteriophage as biological sensors and cell-targeting agents, <http://www.nanowerk.com/news/newsid=239.php>, 01/25/06.

AZoNano.com - The A to Z of Nanotechnology, Gold Nanoshuttle Seeks Out and Treats Disease, <http://www.azonano.com/news.asp?newsID=1790>, 01/25/06.

Medical News Today, Viral, Gold Nanoparticles Can Assemble Themselves To Potentially Find And Treat Disease  
<http://www.medicalnewstoday.com/medicalnews.php?newsid=36582>, 01/26/06.

Medilexicon.com, Viral, Gold Nanoparticles Can Assemble Themselves To Potentially Find And Treat Disease, <http://www.medilexicon.com/medicalnews.php?newsid=36582>, 01/26/06.

American Academy of Anti-aging Medicine, Viral, Gold Nanoparticles Can Assemble Themselves to Find, Treat Disease, <http://www.freerepublic.com/focus/f-chat/1564323/posts>, 01/27/06.

Nanotechnology.net, Viral, Gold Nanoparticles Can Assemble Themselves to Find and Treat Disease, <http://www.nanotechnology.net/index.aspx?ID=69125>, 01/30/06.

NCI Alliance for Nanotechnology, Nanotech News – Gold Nanoparticle-Virus Networks Work as Intracellular Sensors and Targeting Agents  
[http://nano.cancer.gov/news\\_center/nanotech\\_news\\_2006-02-06c.asp](http://nano.cancer.gov/news_center/nanotech_news_2006-02-06c.asp), 02/06/06.

Discovery Channel News, Nanoparticles Pair Up to Fight Disease,  
[http://dsc.discovery.com/news/briefs/20060206/nanoshuttle\\_tec.html](http://dsc.discovery.com/news/briefs/20060206/nanoshuttle_tec.html), 02/10/06.

#### **International**

Alianca de Medicos Contra o Cancer, Mapa do sistema vascular,  
<http://www.amcc.com.br/final/editorial.asp?CodigoNews=32>, 11/02.

Science News, Researchers present the "molecular liposuction,"  
[http://tools.search.yahoo.com/language/translation/translatedPage.php?tt=url&text=http%3a//science.orf.at/science/news/113398&lp=de\\_en](http://tools.search.yahoo.com/language/translation/translatedPage.php?tt=url&text=http%3a//science.orf.at/science/news/113398&lp=de_en), 05/04/04.

BBC Brasil.com, Nova droga bloqueia alimentacao de celulas gordurosas,  
[http://www.bbc.co.uk/portuguese/ciencia/story/2004/05/040510\\_gorduraml.shtml](http://www.bbc.co.uk/portuguese/ciencia/story/2004/05/040510_gorduraml.shtml), 05/10/04.



BBC News, Drug zaps fat into oblivion,  
<http://newsvote.bbc.co.uk/mpapps/pagetools/print/news.bbc.co.uk/1/hi/health/3699741.stm>, 05/10/04.

Daily Mail, 'Fat-zapping' drug could combat obesity,  
[http://www.dailymail.co.uk/pages/live/articles/health/dietfitness.html?in\\_article\\_id=301308&in\\_page\\_id=1798](http://www.dailymail.co.uk/pages/live/articles/health/dietfitness.html?in_article_id=301308&in_page_id=1798), 05/10/04.

Guardian Unlimited, Want to be slim? Cut your blood supply,  
<http://www.guardian.co.uk/medicine/story/0,11381,1213096,00.html>, 05/10/04.

News.Scotsman.com, Obese patients treated in groups to meet NHS targets,  
<http://news.scotsman.com/uk.cfm?id=531682004>, 05/10/04.

Prensa Latina, Cancer strategy could be used to treat obesity,  
<http://www.prensalatinaenglish.com/Article.asp?ID={B1799925-9B4B-4802-A651-2C3DFE137C49}&language=EN>, 05/10/04.

DerStandard.at, Artificial protein lets fat pads melt and makes healthier – with mice,  
<http://translate.google.com/translate?hl=en&sl=de&u=http://derstandard.at/standard.asp%3Fid%3D1660711&prev=/search%3Fq%3DKolonin%2Bmikhail%2Btexas%26start%3D10%26hl%3Den%26lr%3D%26ie%3DUTF-8%26sa%3DN>, 05/11/04.

Focus.it, Obesity, arrives the killer of the cells of fat person,  
[http://translate.google.com/translate?hl=en&sl=it&u=http://www.focus.it/notizie/15474\\_115\\_41.asp&prev=/search%3Fq%3DKolonin%2Bmikhail%2Btexas%26hl%3Den%26lr%3D%26ie%3DUTF-8](http://translate.google.com/translate?hl=en&sl=it&u=http://www.focus.it/notizie/15474_115_41.asp&prev=/search%3Fq%3DKolonin%2Bmikhail%2Btexas%26hl%3Den%26lr%3D%26ie%3DUTF-8), 05/12/04.

Food Policy Forum, New wonder pill cuts body fat by 30% in one month,  
<http://www.foodpolicyforum.co.uk/2004/05/new-wonder-pill-cuts-body-fat-by-30-in.html>, 05/18/04.

ISTOE, Novos ataques contra a gordura,  
[http://www.terra.com.br/istoe/1806/medicina/1806\\_ataques\\_contra\\_gordura\\_01.htm](http://www.terra.com.br/istoe/1806/medicina/1806_ataques_contra_gordura_01.htm), 05/19/04.

Instituto "Carlo De Martino" per la Formazione al Giornalismo - Associazione Walter Tobagi, Un "nanoshuttle" d'oro contro i batteri,  
<http://www.ifgonline.it/pub/165/show.jsp?id=296&iso=1&is=165>, 01/23/06.

EXPLORA - La TV delle Scienze, Un bio-shuttle tutto d'oro,  
[http://www.explora.rai.it/online/doc\\_news.asp?news\\_id=1008](http://www.explora.rai.it/online/doc_news.asp?news_id=1008), 01/24/06.

Benvenuti nel sito Le Scienze.it, Un bio-shuttle tutto d'oro *Lo "scafo" viene fatto costruire direttamente dal virus*  
[http://www.extrapola.com/app/WebObjects/Content.woa/WebRawNews/2006/January/24/67145858/Benvenuti\\_nel\\_sito\\_Le\\_Sci.html](http://www.extrapola.com/app/WebObjects/Content.woa/WebRawNews/2006/January/24/67145858/Benvenuti_nel_sito_Le_Sci.html), 01/24/06.

Energia Ambiente, Il *nanoshuttle* – Indice,  
<http://www.eniscuola.net/appuntamenti.aspx?id=181>, 01/25/06.

Ivanhoe's Medical Breakthroughs, Nanoshuttle Destroys Disease  
[http://www.ivanhoe.com/channels/p\\_channelstory.cfm?storyid=13025](http://www.ivanhoe.com/channels/p_channelstory.cfm?storyid=13025), 01/31/06.

Ciência em Dia - UOL Blog, Banho de ouro cria vírus preciosos  
<http://cienciaemdia.zip.net/>, 02/09/06.

UOL Lição de Casa, Nanotecnologia e engenharia genética, Banho de ouro cria vírus precioso,  
<http://noticias.uol.com.br/licaodecasa/materias/medio/atualidades/ult1685u224.jhtm>,  
02/09/06.

UOL Vestibular, Banho de ouro cria vírus precioso,  
<http://vestibular.uol.com.br/atualidades/ult1685u224.jhtm>, 02/09/06.

ISTOÉ Online, O vírus de ouro, [http://www.terra.com.br/istoe/1896/1896\\_sumario.htm](http://www.terra.com.br/istoe/1896/1896_sumario.htm),  
02/22/06.

[http://cienciaemdia.zip.net/arch2006-05-01\\_2006-05-31.html](http://cienciaemdia.zip.net/arch2006-05-01_2006-05-31.html), 2006

<http://www.medpagetoday.com/HematologyOncology/OtherCancers/tb>, 2006

[http://www.eurekalert.org/pub\\_releases/2006-04/uotm-nhv042006.php](http://www.eurekalert.org/pub_releases/2006-04/uotm-nhv042006.php)

<http://www.sciencedaily.com/releases/2006>

<http://www.asbmb.org/asbmb/site.nsf>, 2006

<http://www.aacr.org/home/scientists/meetings--workshops/special-conferences/previous-special-conferences/innovations-in-prostate-cancer-research.aspx>, 2006

#### **Other**

Hosted former President George Bush and Dr. Mendelsohn in the lab for video to be used for internal purposes as well as media distribution, 2001.

NPR, Science Friday, Morning Edition, Scientists optimistic over fat buster,  
<http://www.npr.org/templates/story/story.php?storyId=1890304>, 05/10/04.

The PNAS website receives almost 2 million hits every week and in 2004 over 10 million article pdfs were downloaded. This article was among the top 100 articles accessed. Pasqualini R and Arap W. Hybridoma-free generation of monoclonal antibodies. Proc Natl Acad Sci USA 101:257-9, 2004.

#### **Office of Development**

Prostate Cancer Research Program, Office of Development Fund Raising, Indian Wells, CA, 2000.

Gillson-Longenbaugh Foundation Luncheon, 2001 – 2006

River Oaks Country Club, 2002.

New York Reception and Dinner, hosted by Michael Bartolotta, Board of Visitors Member, Harvard Club of New York, New York, NY, 11/03.

Participated with MDACC, Dr. Mendelsohn and the Office of Development, International Center, in the Turkish Minister of Health Site Visit, 04/04.

Dr. Robert Cohen/Marcus Foundation Site Visit, Houston, TX, 06/04.

Participated with MDACC, Dr. Mendelsohn and the Office of Development in the Bert Fields (Investment Banking and Oil) Site Visit, 01/23/05.

Participated with MDACC, Dr. Mendelsohn and the Office of Development in the David L. Van Andel (Amway Corporation/Van Andel Institute) Site Visit, 02/10/05.

Participated with MDACC, Office of Development in Bert Fields Site Visit, 01/31/06.

Participated with MDACC, Office of Public Affairs, 2004 – 2005 Conquest Annual Report, 01/06/06.

River Oaks Country Club, 2006.

Participated with MDACC, Office of Development in Reagent Brian Haley Site Visit, 07/06.

Participated with MDACC, Dr. Mendelsohn in the Annual Aspen Seminar and Hines Reception, Aspen, CO, 07/06.

Invited speaker at the V Foundation Fund Raiser, Napa Valley, CA, 08/06.

Participated with MDACC, the Anderson Foundation fund-raising meeting, 05/07.

#### **Consultantships**

N/A

#### **Military or Other Governmental Service**

N/A

#### **HONORS AND AWARDS**

Highest Score, Medical Proficiency Exam, for internship admittance (over 3,000 intern examinees) University of São Paulo Medical School, 1983

Highest score, In-Service Qualifying Exam, Residency in Internal Medicine (over 30 resident examinees), University of São Paulo Medical School, 1984

Medical Career Development Award, Brazilian National Council for Research (CNPq), 1987 – 1990

Clinical Scholars Research Training Fellowship Award, Frederick R. Adler Fellowship in Biomedical Research, Memorial Hospital, Memorial Sloan-Kettering Cancer Center, 1988

Charles A. Dana Foundation Fellowship Award, Memorial Hospital, Memorial Sloan-Kettering Cancer Center, 1989

Clinical Scholar in Biomedical Research, Michael and Ethel Cohen Fellowship Fund, Memorial Hospital, Memorial Sloan-Kettering Cancer Center, 1990

Ph.D. Fellowship Award, Brazilian National Council for Research (CNPq), 1990 – 1993

CaPCURE Award, 1997 – 2002

Angel Works Award, 2000

The Gillson-Longenbaugh Foundation Awards, 2000 – 2006

The V Foundation Award on Translational Cancer Research, 2001

Randall & Dewey Award, 2002

Golfers Against Cancer Foundation Award, 2003

The American Society for Clinical Investigation ("Young Turk"), Inducted 2003

Member, American Diabetes Association Professional Section, Inducted 2005

Marcus Foundation Award, 2006

Member, Board of Scientific Counselors for Clinical Sciences and Epidemiology of the National Cancer Institute, 2006 – 2011

The 2006 Robert M. Chamberlain Distinguished Mentor Award Nominee, 2006

Recipient, Fellows of the M. D. Anderson Research Trust Award, 2006

## **RESEARCH**

### **Grants and Contracts (funded and pending) – past 5 years**

#### **Funded (Principal Investigator)**

Principal Investigator, NIH, P50CA83639, PP-DRP9, Pilot Project of The University of Texas M. D. Anderson Cancer Center SPORE in Ovarian Cancer Award, Identification of tumor markers in ovarian cancer. Director: Robert Bast, M.D, SPORE in Ovarian Cancer, 9/30/99 – 08/31/05, \$50,000.

Principal Investigator, Juvenile Diabetes Foundation, 1-2001-291, Targeting angiogenic vasculature in the retina, 01/01/01 – 02/28/05, \$404,999.

Principal Investigator, NIH, P50CA90270 (PP-4), University of Texas M. D. Anderson SPORE in Prostate Cancer, (Project 4 – Exploring the molecular diversity of blood vessels for diagnostic and therapeutic targeting in prostate cancer), Program Director: Christopher Logothetis, M.D., 06/01/01 – 12/31/06, \$609,379 (\$185,714/year).

Principal Investigator, NIH, U54CA90810 (PP-3), Targeted Assessment of Antiangiogenic Therapy, (Project 3: Implications of the molecular heterogeneity of tumor blood vessels), Program Director: James L. Abbruzzese, M.D., 07/16/01 – 12/31/06, \$790,197 (\$143,440/year).

Principal Investigator, U.S. Department of Defense, DAMD17-02-1-0257, Probing surface heterogeneity of metastatic prostate cancer cells, 02/01/02 – 01/31/05, \$541,383.

Principal Investigator, NCI, R33CA103056, Stem cell-brain tumor interplay and in vivo phage display. 08/15/03 – 07/31/08, (no cost extension), \$1,348,671 (\$444,398/year).

Principal Investigator, NIH, R01DK67683, Imaging tumor blood vessels in bone metastases from breast cancer, 09/10/03 – 08/31/08 (no cost extension), \$1,159,105 (\$231,821/year).

Principal Investigator, NIH, R33CA103030, Mapping vascular diversity of human cancer, 03/15/04 – 02/28/07 (no cost extension), \$843,376 (\$279,099/year).

Principal Investigator, NIH, P50CA100632 (PP-7), University of Texas M. D. Anderson SPORE in Leukemia, (Development Research Award – Identification of therapeutic targets for leukemia by phage display profiling of leukemia cell lines and patient-derived samples), Program Director: Hagop M. Kantarjian, M.D. and Jean-Pierre Issa, M.D, 08/16/04 – 04/30/06, \$23,573.75.

Principal Investigator, NIH, R01 DK070770, Molecular diversity in bladder cancer. 05/01/05 – 04/30/10, \$1,250,000 (\$250,000/year).

**Funded (Co-Principal Investigator, full signature authority)**

Co-Principal Investigator, NIH, R01CA78512, A receptor for tumor-homing peptides in angiogenic vasculature, 9/1/1999 – 06/30/04, \$689,207 (\$182,966/year).

Co-Principal Investigator, NIH, 1R01CA88106, Targeted delivery of genes to angiogenic vasculature, 1/10/00 – 11/30/05, \$570,769 (\$121,001/year).

Co-Principal Investigator, NIH, P01 CA82713, Targeting of tumor vasculature (Sub-award: CD13 in tumor angiogenesis) Program Director: Erkki Ruoslahti, Ph.D., 07/01/00 – 06/30/02, \$412,844.

Co-Principal Investigator, The Gillson-Longenbaugh Foundation Award, Cancer treatment by targeted drug therapy, 08/01/00 – 07/31/07, \$417,000 (\$105,000/year).

Co-Principal Investigator, The V Foundation Award, Award Number 11-99-09932, Translation of the molecular diversity of blood vessels into vascular targeting applications, 01/01/01 – 12/31/04, \$600,000 (\$200,000/year).

Co-Principal Investigator, NIH, P50CA90270 (PP-2), The University of Texas M. D. Anderson SPORE in prostate cancer, (Project 2 - Targeting prostate cancer bone metastasis), Program Director: Christopher Logothetis, M.D., 06/1/01 – 12/31/06, \$597,267 (\$168,635/year).

Co-Principal Investigator, NIH, U01CA91134, Contrasting properties of integrin cytoplasmic domains, 9/4/01 – 8/31/06, \$578,120 (\$151,000/year).

Co-Principal Investigator, U.S. Department of Defense, DAMD17-03-1-0384, DOD Innovator Award Grant: Sub award Agreement No. R14101-7200003, Seamless Integration of detection and therapy for breast cancer using targeted engineered nanoparticles, Program Director: Dr. Naomi Hallas, Rice University, 05/15/03 – 05/14/08, \$420,000 (Sub-award \$133,333/year).

Co-Principal Investigator, U.S. Department of Defense, BC030054, Selection of Therapeutic & Diagnostic Targets by Phage Display Technology, Center of Excellence, Program Director: Saraswathi Sukumar, Ph.D., 07/01/04 – 06/30/09, \$964,623 (Sub award \$185,431/year).

Co-Principal Investigator, NIH, R01CA103830, Optical systems for in vivo molecular imaging of cancer, Program Director: Rebecca Richards Kortum, 08/01/04 – 07/31/09, \$2,164,607 (Sub award \$95,533/year).

Co-Principal Investigator, NIH, P50CA100632, University of Texas M. D. Anderson SPORE in Leukemia, (Project 7 – Identification of therapeutic targets for leukemia by phage display profiling of leukemia cell lines and patient-derived samples), Program Director: Hagop M. Kantarjian, M.D. and Jean-Pierre Issa, M.D, 08/16/04 – 04/30/06, \$170,000.

Co-Principal Investigator, NIH, P50CA091846, Developmental Research Award from the Developmental Research. Director: Colin Dinney, M.D., The Developmental Research Program of the Genitourinary Cancer SPORE, Developmental Research Award - An artificial pore-forming protein with anti-tumor activity, 09/01/04 – 08/31/05, \$30,000.

Co-Principal Investigator, Prostate Cancer Foundation Award, Targeting the interleukin 11R in prostate cancer metastasis, 01/01/05 – 12/31/05, \$100,000.

Co-Principal Investigator, W8XWH-05-2-0027, U.S. Department of Defense, 04091003, IMPACT: Imaging and molecular markers for patients with lung cancer: approaches with molecular targets, complementary/innovative treatments, and therapeutic modalities, Department of Defense, Program Director: Waun Ki Hong, M.D., 02/01/05 – 03/01/09, \$467,111 (\$110,066/year).

Co-Principal Investigator, NIH, R01 HL081658, Regulatory roles for vascular peptidases in angiogenesis, 08/01/05 – 07/31/09, \$1,250,000 (\$250,000/year).

Co-Principal Investigator, Marcus Foundation (Bast) (PP4): Molecular targeting using vascular zip codes. 07/10/06 – 07/09/09, \$330,264 (current year direct cost).

**Pending (Principal Investigator)**

Principal Investigator, Human Frontiers Scientific Program Grant, Integration of targeted gold nanoparticle-phage based scaffolds in cancer biology.

Principal Investigator, 2005 Prostate Cancer Foundation, Hybridoma-free generation of therapeutic monoclonal antibodies against prostate cancer, 03/01/05 – 02/28/06, \$100,000.

Principal Investigator, U. S. Department of Defense, Idea Development Award, Antibodies generated by "Splennomas" as conformational sensors for the electronic-based diagnosis of prostate cancer, 09/01/05 – 08/31/08, \$369,448 (\$120,754/year).

Principal Investigator, U.S. Department of Defense, Concept Award, Probing the lymphatic vasculature for markers involved in breast cancer metastasis, 07/01/06 – 06/30/07, \$75,000.

Principal Investigator, Juvenile Diabetes Research Foundation, Targeted nanoparticles for imaging and ablation in diabetic retinopathy, 08/01/06 – 07/31/09, \$450,000 (\$150,000/year).

Principal Investigator, NIH, Cellular diversity of the kidney and kidney cancer, 12/01/06 – 11/30/11, \$1,250,000 (\$250,000/year).

Principal Investigator, U.S. Department of Defense, Idea Development Award, Ligand-directed molecular imaging in prostate cancer: Implications for diagnosis and therapy, 01/01/07 – 12/31/09, \$375,000 (\$125,000/year).

Principal Investigator, U.S. Department of Defense, Concept Award, Ovarian cancer antibodies generated by splenoma technology, 01/01/07 – 06/30/08, \$75,000.

**Pending (Co-Principal Investigator)**

Co-Principal Investigator, NIH, R33CA122668-01, Ligand-directed mapping of molecular targets in cancer, 07/01/07 – 06/30/12, \$1,250,000 (\$250,000/year).

Co-Principal Investigator, NIH, R01CA113864-01A1, Targeted phage-based vectors for systemic delivery of therapeutic agents to brain tumor, 12/01/07 – 11/30/12, \$1,250,000 (\$250,000/year).

Co-Principal Investigator, NIH, R21CA128466-01, Gold Nanoparticle-based Scaffolds for Targeted Imaging and Tissue Ablation, 04/01/08 – 3/31/11, \$200,000 (\$1,00,000/year).

Co-Principal Investigator, NIH, R01CA127251, The interleukin 11 receptor in angiogenesis and tissue remodeling, 04/01/08 – 03/31/13, \$1,250,000 (\$250,000/year).

Co-Principal Investigator, U.S. Department of Defense, Concept Award, "Molecular biopsy" for early diagnosis and disease monitoring in breast cancer patients, 07/01/07 – 06/30/08, \$75,000.

Co-Principal Investigator, NIH, Integration of vascular genomics and proteomics for diagnosis and therapy of cancer, 02/01/08 – 01/30/13, \$1,479,193 (\$487,847/year).

**Funded Protocols**

LAB05-0154: Studies on Blood and Tumor Tissues from Patients with Lung Cancer

LAB05-0027: Laboratory Immunological Studies on Blood and Tumor Tissues from Patients with Genitourinary Cancers

LAB05-0257: Studies on Blood and Tumor Tissue from Patients with Breast Cancer

LAB05-0286: Immunological Studies on Blood and Tumor Tissues from Patients with Ovarian Cancer

LAB05-0459: Studies on Blood and Tumor Tissues from Patients with Brain Cancer

LAB04-0678: Pre-Clinical Development and Testing of New Therapeutic Agents for Chronic Lymphoid Malignancies

ACUF ID#: 11-04-10631, Targeting Therapies

ACUF ID#: 11-99-09932, Targeting Blood Vessels

ACUF ID#: 11-99-09933, Targeting Blood Vessels

2005-0297: A Phase 1/2 Safety and Pharmacokinetic Study of SU011248 in Combination with Docetaxel (Taxotere®) and Prednisone in Patients with Metastatic Hormone Refractory Prostate Cancer (HRPC) 2005-0297

**Patents Granted and Pending (U.T. M. D. Anderson Cancer Center)**

<b>Tab No.</b>	<b>F&amp;J/MDA/BS File Code</b>	<b>Filing/ Priority Date</b>	<b>Serial No.</b>	<b>Title</b>	<b>Status</b>
1	UTSC:674USP1 MDA00-025	09/08/00	60/231,266	"Compositions and Methods for Organ and Tissue Targeting in Humans"	Converted
2.	UTSC:674US MDA00-025	01/17/01 09/08/00	09/765,101		Converted to provisional application
3	UTSC:850US MDA00-025B P001	03/07/03 09/08/00	10/363,203	"Adenoviral Targeting and Manipulation of Immune System Response Using Targeting Peptides"	Pending
4	UTFC:850WO* MDA00-025B P001PCT	09/07/01 09/08/00	PCT/US/01 28045		Nationalized
5	UTFC:850AU MDA00-025B P001AU	09/07/01 09/08/00	2001/ 290663		Pending
6	UTFC:850CA MDA00-025B P001CA	09/07/01 09/08/00	2,421,200		Pending
7.	UTFC:850EP MDA00-025B P001EP	09/07/01 09/08/00	01970682.9		Pending
8.	UTFC:850JP MDA00-025B P001JP	09/07/01 09/08/00	2002/ 525731		Pending
9.	UTSC:851US MDA00-025C P002	03/07/03 09/08/00	10/363,202	"Compositions and Methods for Targeting Peptides in Humans In Vivo"	Pending
10.	UTFC:851WO* MDA00-025C P002PCT	09/07/01 09/08/00	PCT/US01/2 8044		Nationalized
11.	UTFC:851AU MDA00-025C P002AU	09/07/01 09/08/00	2001/ 290662		Pending
12.	UTFC:851CA MDA00-025C P002CA	09/07/01 09/08/00	2,421,195		Pending

\* Note that each of UTFC:850WO, UTFC:851WO, UTFC:852WO and UTFC:853WO base priority on 60/231,266, filed 9/08/00 (formerly our file ref. UTSC:674, now UTSC:850USP1)



Tab No.	F&J/MDA/BS File Code	Filing/ Priority Date	Serial No.	Title	Status
13.	UTFC:851EP MDA00-025C P002EP	09/07/01 09/08/00	01970681.1		Pending
14.	UTFC:851JP MDA00-025C P002JP	09/07/01 09/08/00	2002/ 525730		Pending
15.	UTSC:852US MDA00-025D P003	03/07/03 09/08/00	10/363,204	"Human and Mouse Targeting Peptides Identified by Phage Display"	Pending
16.	UTFC:852WO* MDA00-025D P003PCT	09/07/01 09/08/00	PCT/US01/2 7692		Nationalized
17.	UTFC:852AU MDA00-025D P003AU	09/07/01 09/08/00	2001/ 288843		Pending
18.	UTFC:852CA MDA00-025D P003CA	09/07/01 09/08/00	2,421,271		Pending
19.	UTFC:852EP MDA00-025D P003EP	09/07/01 09/08/00	01968603.9		Pending
20.	UTFC:852JP MDA00-025D P003JP	09/07/01 09/08/00	2002/ 525776		Pending
21.	UTSC:853US MDA00-025E P004	03/07/03 09/08/00	10/363,205	"Biopanning and Rapid Analysis of Selective Interactive Ligands"	Pending
22.	UTFC:853WO* MDA00-025E P004PCT	09/07/01 09/08/00	PCT/US01/2 8124		Nationalized
23.	UTFC:853AU MDA00-025E P004AU	09/07/01 09/08/00	2001/ 288914		Pending
24.	UTFC:853CA MDA00-025E P004CA	09/07/01 09/08/00	2,421,380		Pending

Tab No.	F&J/MDA/BS File Code	Filing/ Priority Date	Serial No.	Title	Status
25.	UTFC:853EP MDA00-025E P004EP	09/07/01 09/08/00	01968683.1		Pending
26.	UTFC:853JP MDA00-025E P004JP	09/07/01 09/08/00	2002/ 525828		Pending
27.	UTFC:854WO MDA00-025F P005PCT	09/07/01 09/08/00	PCT/US01/2 7702		Nationalized
28.	UTSC:854US MDA00-025F P005	09/02/03 09/08/00	10/363,208	"Methods and Compositions for In Vitro Targeting"	Pending
29.	UTFC:854AU MDA00-025F P005AU	09/07/01 09/08/00	2001/ 290,652		Pending
30.	UTFC:854CA MDA00-025F P005CA	09/07/01 09/08/00	2,421,191		Pending
31.	UTFC:854EP MDA00-025F P005EP	09/07/01 09/08/00	01970671.2		Pending
32.	UTFC:854JP MDA00-025F P005JP	09/07/01 09/08/00	2002/ 525729		Pending
33.	UTSC:855USP1 MDA01-093 P008Z	07/18/01	60/306,506	"Anti-Angiogenic State in Mice and Humans with Retinal Photoreceptor Cell Degeneration"	Expired
34.	UTFC:855WO MDA01-093 P008PCT	07/17/02 07/18/01	PCT/US02/2 2971		Nationalized
35.	UTSC:855US MDA01-093 NA	01/20/04 07/18/01	10/484,550		Pending
36.	UTFC:855EP MDA01-093	07/17/02 07/18/01	02761131.8		Pending

Tab No.	F&J/MDA/BS File Code	Filing/ Priority Date	Serial No.	Title	Status
37.	UTFC:855CA MDA01-093	07/17/02 07/18/01	2,454,357		Pending
38.	UTFC:856WO MDA00-025CIP1 P009PCT	08/30/02 09/07/01	PCT/US02/2 7836	"Compositions and Methods of Use of Targeting Peptides Against Placenta and Adipose Tissues"	Nationalized
39.	UTSC:856US MDA00-025CIP1	03/08/04 09/07/01	10/489,071		Pending
40.	UTSC:856EP MDA00-025CIP1	04/06/04 09/07/01	Not received yet		Pending
41.	UTFC:856CA MDA00-025CIP1	08/30/02 09/07/01	Not received yet		Pending
42.	UTFC:857WO MDA04-113 P010PCT	10/30/02 08/30/02	PCT/US02/3 4987	"Compositions and Methods of Use of Targeting Peptides for Diagnosis and Therapy of Human Cancer"	Pending
43.	UTSC:858USP1 MDA03-071P1 P011Z	04/14/03	60/462,631	"Methods for Hybridoma-Free Production of Murine and Human Monoclonal Antibodies"	Pending
44.	UTSC:860USP1 MDA03-071P2 P013Z	11/24/03	60/524,701	"Methods for Ex Vivo Hybridoma-Free Production of Murine and Human Polyclonal and Monoclonal Antibodies and Generation of Immortalized Cell Populations"	Pending

Tab No.	F&J/MDA/BS File Code	Filing/ Priority Date	Serial No.	Title	Status
45.	UTSC:858US MDA03-071	04/14/04 04/14/03 & 11/24/03	10/824,627	"Methods for Ex Vivo Hybridoma-Free Production of Polyclonal and Monoclonal Antibodies and Generation of Immortalized Cell Populations"	Pending
46.	UTFC:858WO MDA03-071	04/14/04 04/14/03	PCT/US04/1 1427		Pending
47.	UTSC:859USP1 MDA03-125 P012Z	09/12/03	60/502,509	"Biopanning as an Approach to Study the Pathogenesis of an Invent Novel Treatment Modalities for Invasive Aspergillosis"	Pending
48.	UTSC:861USP1 MDA04-030 P014Z	12/31/03	60/533,650	"Compositions and Methods of Use of Targeting Peptides for Diagnosis and Therapy" (IL-11 Receptor Targeting)	Pending
49.	UTSC:872US MDA00-025CIP2	02/23/04 09/08/00	10/784,537	"Aminopeptidase A (APA) Targeting Peptides for the Treatment of Cancer"	Pending
50.	UTSC:890USP1 MDA04-089	07/10/04	60/586,814	"Composition and Methods Related to Peptides that Selectively Bind Leukemic Cells."	Provisional application filed
51.	UTSC:889 MDA04-083	11/16/2004	60/628,472	"Methods and Compositions Related to Phage Nanoparticles"	Provisional application filed
52.	UTXC:891 MDA04-093	11/16/2004	60/628,495	"Synchronous Selection of Homing Peptides for Multiple Tissues by in Vivo Phage Display"	Provisional application filed
53.	UTSC:916USP1	03/09/06		"Compositions and Methods Related to Profiling A Plurality of Cell Lines Based on Peptide Binding"	Provisional application filed
54.		04/01/06		"Targeted Manipulation of Gene Expression"	Provisional application filed

### Patents Granted and Pending (The Burnham Institute)

Family	#	Patent/Patent Application No.	C&F Docket#	Patent Type
1		Chimeric prostate-homing peptides with-proapoptotic activity		
	1	09/489,582	P-LJ 3844	Parent
	2	09/765,086	P-LJ 4575	
2	3	Methods of targeting angiogenic vasculature using gelatinase inhibitors		
		09/552,805	P-LJ 3802	

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### Grant Reviewer/Service on NIH/Other Study Sections

Department of Defense, Prostate Cancer Research Program, 1999

Dutch Cancer Society, 2000 – Present

Susan G. Komen Breast Cancer Foundation, 2000, 2001

Rapid Access to Intervention Development (RAID) Program, NCI, 2001

Prostate and Breast SPORE, NCI, 2001

Health Research Board, Ireland, 2002

Innovative Molecular Analysis Technologies (IMAT) Program, NIH Study Section Review, 2003

Innovative Molecular Analysis Technologies (IMAT) Program, NIH Study Section Review, 2004

Hong-Kong Academy of Sciences, 2004

Member of Site Visit Team to review the NCI Experimental Transplantation and Immunology Intramural Branch, 11/2004

Member, Special Emphasis Panel Review Meeting, Bethesda, MD, 03/29/05

Member, IMAT Review, 07/14/05

Member, Applied Emerging Technologies for Cancer Research, 03/06

Member, IRG Study Section Review Committee for Clinical, Translational, and Population-based Projects, MDACC, 06/07

### PUBLICATIONS

#### a. Articles in Peer-Reviewed Journals

1. Sesso A, Catena RS, Carneiro SM, **Arap W**. Condensing vacuole and zymogen granule size in the rat pancreatic acinar cell during the perinatal period. *Acta Anatomica (Basel)* 3:141,1981.
2. Aun F, Medeiros NGA, **Arap W**, Younes RN, Birolini D, Oliveira MR. Changing on serum concentration of the thyroid hormones following severe traumatism. *Arq Bras Endocrinol Metab (Portuguese)* 26:57-60, 1982.
3. Arap S, **Arap W**, Chedid EA, Mitre AI, Menezes de Goes G. Ureterocele of the lower pole ureter and an ectopic upper pole ureter in a duplex system. *J Urol* 129:1227-8, 1983.

4. Arap S, **Arap W**. Clinical evaluation of efficacy and tolerance of kelfiprim suspension in children with acute urinary infection. Comparative study with cotrimoxazol. *RBM Rev Bras Med* (Portuguese) 40:91-5, 1983.
5. Arap S, **Arap W**, Chedid NE. Clinical evaluation of a new cephalosporin (cefaciator) in the treatment of acute urinary tract infections. *Folha Méd* (Portuguese) 88:173-6, 1984.
6. **Arap W**, Lopes RN, Cury M, Montelatto NI, Arap S. Vesical endometriosis. *Urology* 24:271-4, 1984.
7. **Arap W**, Arap S. Tetracycline phosphate complex in the treatment of urethritis by *C. trachomatis*. *Rev Bras Clin Ter* (Portuguese) 15:106-8, 1986.
8. Rocha M, **Arap W**. Diagnosis the peritoneal pseudomyxoma by computed tomography. *Rev Imagem* (Portuguese) 8:171-2, 1986.
9. Del Giglio A, Franco EL, Torloni H, Marques LA, Brentani MM, **Arap W**, Macchione M, Chammas R. Tumor and serum beta-2 microglobulin expression in women with breast cancer. *Am J Clin Pathol* 92:339-42, 1989.
10. **Arap W**, Nishikawa R, Furnari FB, Cavenee WK, Huang HJ. Replacement of the p16/CDKN2 gene suppresses human glioma cell growth. *Cancer Res* 55:1351-4, 1995.
11. Nishikawa R, Furnari FB, Lin H, **Arap W**, Berger MS, Cavenee WK, Huang HJ. Loss of P16INK4 expression is frequent in high-grade gliomas. *Cancer Res* 55:1941-5, 1995.
12. Cheng SY, Huang HJ, Nagane M, Ji XD, Wang D, Shih CC, **Arap W**, Huang CM, Cavenee WK. Suppression of glioblastoma angiogenicity and tumorigenicity by inhibition of endogenous expression of vascular endothelial growth factor. *Proc Natl Acad Sci U S A* 93:8502-7, 1996.
13. **Arap W**, Knudsen ES, Wang JY, Cavenee WK, Huang HJ. Point mutations can inactivate in vitro and in vivo activities of p16INK4a/CDKN2A in human glioma. *Oncogene* 14:603-9, 1997.
14. Costello JF, Plass C, **Arap W**, Chapman VM, Held WA, Berger MS, Huang HJ, Cavenee WK. Cyclin-dependent kinase 6 (CDK6) amplification in human gliomas identified using two-dimensional separation of genomic DNA. *Cancer Res* 57:1250-4, 1997.
15. **Arap W**, Knudsen E, Sewell DA, Sidransky D, Wang JY, Huang HJ, Cavenee WK. Functional analysis of wild-type and malignant glioma derived CDKN2A beta alleles: Evidence for an RB-independent growth suppressive pathway. *Oncogene* 15:2013-20, 1997.
16. **Arap W**, Pasqualini R, Ruoslahti E. Cancer treatment by targeted drug delivery to tumor vasculature in a mouse model. *Science* 279:377-80, 1998.
17. Rajotte D, **Arap W**, Hagedorn M, Koivunen E, Pasqualini R, Ruoslahti E. Molecular heterogeneity of the vascular endothelium revealed by in vivo phage display. *J Clin Invest* 102:430-7, 1998.
18. **Arap W**, Huang HJ. Expression of integrin transcripts in human cancer cells. *Methods Mol Biol* 129:91-101, 1999.
19. Burg MA, Pasqualini R, **Arap W**, Ruoslahti E, Stallcup WB. NG2 proteoglycan-binding peptides target tumor neovasculature. *Cancer Res* 59:2869-74, 1999.

20. Ellerby HM, **Arap W**, Ellerby LM, Kain R, Andrusiak R, Rio GD, Krajewski S, Lombardo CR, Rao R, Ruoslahti E, Bredesen DE, Pasqualini R. Anti-cancer activity of targeted pro-apoptotic peptides. *Nat Med* 5:1032-8, 1999.
21. Koivunen E, **Arap W**, Valtanen H, Rainisalo A, Medina OP, Heikkila P, Kantor C, Gahmberg CG, Salo T, Kontinen YT, Sorsa T, Ruoslahti E, Pasqualini R. Tumor targeting with a selective gelatinase inhibitor. *Nat Biotechnol* 17:768-74, 1999.
22. Pasqualini R, Koivunen E, Kain R, Lahdenranta J, Sakamoto M, Stryhn A, Ashmun RA, Shapiro LH, **Arap W**, Ruoslahti E. Aminopeptidase N is a receptor for tumor-homing peptides and a target for inhibiting angiogenesis. *Cancer Res* 60:722-7, 2000.
23. Tellier MC, Greco G, Klotman M, Mosoian A, Cara A, **Arap W**, Ruoslahti E, Pasqualini R, Schnapp LM. Superfibronection, a multimeric form of fibronectin, increases HIV infection of primary CD4+ T lymphocytes. *J Immunol* 164:3236-45, 2000.
24. Bhagwat SV, Lahdenranta J, Giordano R, **Arap W**, Pasqualini R, Shapiro, LH. CD13/APN is activated by angiogenic signals and is essential for capillary tube formation. *Blood* 97:652-9, 2001.
25. Giordano RJ, Cardó-Vila M, Lahdenranta J, Pasqualini R, **Arap W**. Biopanning and rapid analysis of selective interactive ligands. *Nat Med* 7:1249-53, 2001.
26. Grifman M, Trepel M, Speece P, Gilbert LB, **Arap W**, Pasqualini R, Weitzman MD. Incorporation of tumor-targeting peptides into recombinant adeno-associated virus capsids. *Mol Ther* 3:964-75, 2001.
27. Lahdenranta J, Pasqualini R, Schlingemann RO, Hagedorn M, Stallcup WB, Bucana CD, Sidman RL, **Arap W**. An anti-angiogenic state in mice and humans with retinal photoreceptor cell degeneration. *Proc Natl Acad Sci U S A* 98:10368-73, 2001.
28. Trepel M, **Arap W**, Pasqualini R. Modulation of the immune response by systematic targeting of antigens to lymph nodes. *Cancer Res* 61:8110-12, 2001.
29. **Arap W**, Haedicke W, Bernasconi M, Kain R, Rajotte D, Krajewski S, Ellerby HM, Bredesen DE, Pasqualini R, Ruoslahti E. Targeting the prostate for destruction through a vascular address. *Proc Natl Acad Sci U S A* 99:1527-31, 2002.
30. **Arap W**, Kolonin MG, Trepel M, Lahdenranta J, Cardó-Vila M, Giordano RJ, Mintz PJ, Ardelt PU, Yao VJ, Vidal CI, Chen L, Flamm A, Valtanen H, Weavind LM, Hicks ME, Pollock RE, Botz GH, Bucana CD, Koivunen E, Cahill D, Troncso P, Baggerly KA, Pentz RD, Do K-A, Logothetis CJ, Pasqualini R. Steps toward mapping the human vasculature by phage display. *Nat Med* 8:121-7, 2002.
31. Curnis F, Arrigoni G, Sacchi A, Fischetti L, **Arap W**, Pasqualini R, Corti A. Differential binding of drugs containing the NGR motif to CD13 isoforms in tumor vessels, epithelia, and myeloid cells. *Cancer Res* 62:867-74, 2002.
32. Kolonin MG, Pasqualini R, **Arap W**. Teratogenicity induced by targeting a placental immunoglobulins transporter. *Proc Natl Acad Sci U S A* 99:13055-60, 2002.
33. Ardelt PU, Wood CG, Chen L, Mintz PJ, Moya C, Arap MA, Wright KC, Pasqualini R, **Arap W**. Targeting urothelium: Ex-vivo assay standardization and selection of internalizing ligands. *J Urol* 169:1535-40, 2003.

34. Cardó-Vila M, **Arap W**, Pasqualini R.  $\alpha v \beta 5$  Integrin-Dependent programmed cell death triggered by a peptide mimic of Annexin V. *Mol Cell* 11:1151-62, 2003.
35. Ellerby HM, Lee S, Ellerby LM, Chen S, Kiyota T, del Rio G, Sugihara G, Sun Y, Bredesen DE, **Arap W**, Pasqualini R. An artificially designed pore-forming protein with anti-tumor effects. *J Biol Chem* 278:35311-16, 2003.
36. Mintz P, Kim J, Do KA, Wang X, Zinner RG, Cristofanilli M, Arap MA, Hong WK, Troncso P, Logothetis CJ, Pasqualini R, **Arap W**. Fingerprinting the circulating repertoire of antibodies from cancer patients. *Nat Biotechnol* 21:57-63, 2003.
37. Müller OJ, Kaul F, Weitzman MD, Pasqualini R, **Arap W**, Kleinschmidt JA, Trepel M. Random peptide libraries displayed on adeno-associated virus to select for targeted gene therapy vectors. *Nat Biotechnol* 21:1040-46, 2003.
38. Pentz RD, Flamm AL, Pasqualini R, Logothetis CJ, **Arap W**. Revisiting ethical guidelines for research with terminal wean and brain-dead participants. *Hastings Cent Rep* 33:20-6, 2003.
39. Tamm I, Trepel M, Cardó-Vila M, Sun Y, Welsh K, Cabezas E, Swatterthwait A, **Arap W**, Reed JC, Pasqualini R. Peptides targeting caspase inhibitors. *J Biol Chem* 278:14401-05, 2003.
40. Arap MA, Lahdenranta J, Mintz PJ, Hajitou A, Sarkis AS, **Arap W**, Pasqualini R. Cell surface expression of the stress response chaperone GRP78 enables tumor targeting by circulating ligands. *Cancer Cell* 6:275-84, 2004.
41. Arap MA, Lahdenranta J, Hajitou A, Marini FC III, Wood CG, Wright KC, Fueyo J, **Arap W**, Pasqualini R. Model of unidirectional transluminal gene transfer. *Mol Ther* 9:305-10, 2004.
42. Chen L, Zurita AJ, Ardelt PU, Giordano RJ, **Arap W**, Pasqualini R. Design and validation of a bifunctional ligand display system for receptor targeting. *Chem Biol* 11:1081-91, 2004.
43. Kolonin MG, Saha PK, Chan L, Pasqualini R, **Arap W**. Reversal of obesity by targeted ablation of adipose tissue. *Nat Med* 10:625-32, 2004.
44. Marchió S, Lahdenranta J, Schlingemann RO, Valdembri D, Wesseling P, Arap MA, Hajitou A, Ozawa MG, Trepel M, Giordano RJ, Nanus DM, Dijkman HBPM, Oosterwijk E, Sidman RL, Cooper MD, Bussolino F, Pasqualini R, **Arap W**. Aminopeptidase A is a functional target in angiogenic blood vessels. *Cancer Cell* 5:151-62, 2004.
45. Pasqualini R, **Arap W**. Hybridoma-free generation of monoclonal antibodies. *Proc Natl Acad Sci U S A* 101:257-9, 2004.
46. Vidal CI, Mintz PJ, Lu K, Ellis LM, Manenti, L, Giavazzi R, Gershenson DM, Broaddus R, Liu J, **Arap W**, Pasqualini R. An HSP90-mimic peptide revealed by fingerprinting the pool of antibodies from ovarian cancer patients. *Oncogene* 23:8859-67, 2004.
47. Zurita AJ, Troncso P, Cardó-Vila M, Logothetis CJ, Pasqualini R, **Arap W**. Combinatorial screenings in patients: The interleukin-11 receptor  $\alpha$  as a candidate target in the progression of human prostate cancer. *Cancer Res* 64:435-9, 2004.
48. Marchió S, Alfano M, Primo L, Gramaglia D, Butini L, Gennero L, De Vivo E, **Arap W**, Giacca M, Pasqualini R, Bussolino F. Cell surface-associated Tat modulates HIV-1 infection and spreading through a specific interaction with gp120 viral envelope protein. *Blood* 105:2802-11, 2005.



49. Yao VJ, Ozawa MG, Trepel M, **Arap W**, McDonald DM, Pasqualini R. Targeting pancreatic islets with phage display assisted by laser pressure catapult microdissection. *Am J Path* 166:625-36, 2005.
50. Giordano RJ, Anobom CD, Cardó-Vila M, Kalil J, Valente AP, Pasqualini R, Almeida FCL, **Arap W**. Structural basis for the interaction of a vascular endothelial growth factor mimic peptide motif and its corresponding receptors. *Chem Biol* 12:1075-83, 2005.
51. Ozawa MG, Yao VJ, Chanthery YH, Troncoso P, Uemura A, Varner AS, Kasman IM, Pasqualini R, **Arap W**, McDonald DM. Angiogenesis with pericyte abnormalities in a transgenic model of prostate cancer. *Cancer* 104:2104-15, 2005.
52. Pentz RD, Cohen CB, Wicclair M, DeVita MA, Flamm AL, Youngner SJ, Hamric AB, McCabe MS, Glover J, Kittiko WJ, Kinlaw K, Keller J, Asch A, Kavanagh JJ, **Arap W**. Ethics guidelines for research with the recently dead. *Nat Med* 11:1145-49, 2005.
53. Lionakis MS, Lahdenranta J, Sun J, Liu W, Lewis RE, Albert ND, Pasqualini R, **Arap W**, Kontoyiannis DP. Development of a ligand-directed approach to study the pathogenesis of invasive aspergillosis. *Infect Immun* 73:7747-58, 2005.
54. Oh Y, Mohiuddin I, Sun Y, Putman JB, Jr, Hong WK, **Arap W**, Pasqualini R. Phenotypic diversity of the lung vasculature in experimental models of metastases. *Chest* 128 (Suppl 6):596S-600S, 2005.
55. Barker TH, Baneyx G, Cardo-Vila M, Workman GA, Weaver M, Menon PM, Dedhar S, Rempel SA, **Arap W**, Pasqualini R, Vogel V, Sage EH. SPARC regulates extracellular matrix organization through its modulation of integrin-linked kinase activity. *J Biol Chem* 280:36483-93, 2005.
56. Yao VJ, Ozawa MG, Varner AS, Kasman IM, Chanthery Y, Pasqualini R, **Arap W**, McDonald DM. Anti-angiogenic therapy decreases integrin expression in normalized tumor blood vessels. *Cancer Res* 66:2639-49, 2006.
57. Souza GR, Christianson DR, Staquicini FI, Ozawa MG, Snyder EY, Sidman RL, Miller JH, **Arap W**, Pasqualini R. Networks of gold nanoparticles and bacteriophage as biological sensors and cell-targeting agents. *Proc Natl Acad Sci U S A* 103:1215-1220, 2006.
58. Kolonin MG, Bover L, Sun J, Zurita AJ, Do KA, Lahdenranta J, Cardó-Vila M, Giordano RJ, Jaalouk DE, Ozawa MG, Moya CA, Souza GR, Staquicini FI, Kunyiasu A, Scudiero DA, Holbeck SL, Sausville EA, **Arap W**, Pasqualini R. Ligand-directed surface profiling of human cancer cells with combinatorial peptide libraries. *Cancer Res* 66:34-40, 2006.
59. Hajitou A, Trepel M, Lilley CE, Soghomonyan S, Alauddin MM, Marini FC III, Restel BH, Ozawa MG, Moya CA, Rangel R, Sun Y, Zaoui K, Schmidt M, von Kalle C, Weitzman MD, Gelovani JG, Pasqualini R, **Arap W**. A hybrid vector for ligand-directed tumor targeting and molecular imaging. *Cell* 125:385-98, 2006.
60. Kolonin MG, Sun J, Do KA, Vidal CI, Ji Y, Baggerly KA, Pasqualini R, **Arap W**. Synchronous selection of homing peptides for multiple tissues by in vivo phage display. *FASEB J* 20:979-81, 2006.
61. Souza GR, Levin CS, Hajitou A, Pasqualini R, **Arap W**, Miller JH. In vivo detection of gold-imidazole self-assembly complexes: NIR-SERS signal reporters. *Anal Chem* 78:6232-37, 2006.

62. Tudor RM, Yoshida T, **Arap W**, Pasqualini R, Petrache I. State of the art. Cellular and molecular mechanisms of alveolar destruction in emphysema: An evolutionary perspective. *Proc Am Thorac Soc* 3:503-10, 2006.
63. Kzhyshkowska J, Workman G, Cardó-Vila M, **Arap W**, Pasqualini R, Gratchev A, Krusell L, Goerdts S, Sage EH. Novel function of alternatively activated macrophages: stabilin-1 mediated clearance of SPARC. *J Immunol* 176:5825-32, 2006.
64. Hajitou A, Rangel R, Trepel M, Soghomonyan S, Gelovani JG, Alauddin MM, Pasqualini R, **Arap W**. Design and construction of targeted AAVP vectors for mammalian cell transduction. *Nat Protoc* 3:523-31, 2007.
65. Rangel R, Sun Y, Guzman-Rojas L, Ozawa MG, Sun J, Giordano RJ, Van Pelt CS, Tinkey PT, Behringer RR, Sidman RL, **Arap W**, Pasqualini R. Impaired angiogenesis in aminopeptidase N-null mice. *Proc Natl Acad Sci U S A* 14:4588-93, 2007.
66. Ji Y, Yin GS, Tsui KW, Kolonin MG, Sun J, **Arap W**, Pasqualini R, Do KA. Bayesian mixture models for complex high dimensional count data in phage display experiments. *Appl Statist* 56:1-14, 2007.
67. Soghomonyan S, Hajitou A, Rangel R, Pasqualini R, **Arap W**, Gelovani JG, Alauddin M. Molecular PET imaging of HSV1-tk reporter gene expression using <sup>18</sup>F-FEAU. *Nat Protoc* 2:416-23, 2007.
68. Lahdenranta J, Sidman RL, Pasqualini R, **Arap W**. Treatment of hypoxia-induced retinopathy with targeted proapoptotic peptidomimetic in a mouse model of disease. *FASEB J*, Epub ahead of print, 05/18/07.
69. Bover LC, Cardó-Vila M, Sun J, Aggarwal B, **Arap W**, Pasqualini R. A previously unrecognized protein-protein interaction between TWEAK and CD163: potential biological implications. *J Immunol* (In press).

**b. Invited Articles**

1. **Arap W**, Huang HJ, Cavenee WK. Cancer genetics and tumor suppression. *J Br Assoc Adv Sci* 46:18-33, 1994.
2. **Arap W**, Pasqualini R, Ruoslahti E. Chemotherapy targeted to tumor vasculature. *Curr Opin Oncol* 10:560-5, 1998.
3. Koivunen E, **Arap W**, Rajotte D, Lahdenranta J, Pasqualini R. Identification of receptor ligands with phage display peptide libraries. *J Nucl Med* 40:883-8, 1999.
4. **Arap W**, Pasqualini R. The human vascular mapping project. Selection and utilization of molecules for tumor endothelial targeting. *Haemostasis* 31 (Suppl 1):30-1, 2001.
5. Kolonin M, Pasqualini R, **Arap W**. Molecular addresses in blood vessels as targets for therapy. *Curr Opin Chem Biol* 5:308-13, 2001.
6. Pasqualini R, **Arap W**, McDonald D. Probing the structural and molecular diversity of tumor vasculature. *Trends Mol Med* 8:563-71, 2002.
7. Trepel M, Pasqualini R, **Arap W**. In vivo phage display and vascular heterogeneity: implications for targeted medicine. *Curr Opin Chem Biol* 6:399-404, 2002.
8. Pasqualini R, **Arap W**. Translation of vascular diversity into targeted therapeutics. *Ann Hematol* 81(Suppl 2):S66-7, 2002.

9. **Arap W**, Pasqualini R. In vivo screening: Vascular Maps. *Nature Reviews in Drug Discovery* 1:174, 2002.
10. Pasqualini R, Barbas CF 3rd, **Arap W**. Putting a Finger on Angiogenesis. *Nat Med* 2002.
11. Sokolov K, Aaron J, Hsu B, Nida D, Gillenwater A, Follen M, MacAulay C, Adler-Storthz K, Korgel B, Descour M, Pasqualini R, **Arap W**, Lam W, Richards-Kortum R. Optical systems for in vivo molecular imaging of cancer. *Technol Cancer Res Treat* 2:491-504, 2003.
12. Zurita AJ, **Arap W**, Pasqualini R. Mapping tumor vascular diversity by screening phage display libraries. *J Control Release* 91:183-6, 2003.
13. Hajitou A, Pasqualini R, **Arap W**. Vascular targeting: Recent advances and therapeutic perspectives. *Trends Cardiovasc Med* 16:80-8, 2006.
14. Sergeeva A, Kolonin MG, Molldrem JJ, Pasqualini R, **Arap W**. Display technologies: application for the discovery of drug and gene delivery agents. *Adv Drug Deliv Rev* 58:1622-54, 2006.
15. Sato M, Pasqualini R, **Arap W**. Molecular Targets on Blood Vessels for Cancer Therapies Currently in Clinical Trials. *Oncology* (In press).
16. Pasqualini R, **Arap W**. Therapeutic applications of vascular proteomics. *Nat Rev Drug Disc* (In press).

**c. Editorials & Letters**

1. Trepel M, **Arap W**, Pasqualini R. Exploring vascular heterogeneity for gene therapy targeting. *Gene Ther* 7:2059-60, 2000.
2. Cardó-Vila M, Arden KC, Cavenee WK, Pasqualini R, **Arap W**. Is annexin 7 a tumor suppressor gene in prostate cancer? *Pharmacogenomics J* 1:92-4, 2001.
3. Pasqualini R, McDonald DM, **Arap W**. Vascular targeting and antigen presentation. *Nat Immunol* 2:567-8, 2001.
4. Pasqualini R, Barbas CF III, **Arap W**. Vessel maneuvers: Zinc fingers promote angiogenesis. *Nat Med* 8:1353-4, 2002.
5. Kontoyiannis DP, Pasqualini R, **Arap W**. Aminopeptidase N inhibitors and SARS. *Lancet* 361:1558, 2003.
6. **Arap W**, Pasqualini R. Engineered embryonic endothelial progenitor cells as therapeutic Trojan horses. *Cancer Cell* 5: 406-8, 2004.

**d. Other Articles**

N/A

**e. Abstracts (since relocation to The University of Texas M. D. Anderson Cancer Center)**

1. **Arap W**, Pasqualini R. The human vascular mapping project. CaPCURE 8th Annual Scientific Retreat, Lake Tahoe, NV, September 6-9, 2001.
2. Giordano R, Cardó-Vila M, Lahdenranta J, Pasqualini R, **Arap W**. Biopanning and rapid analysis of selective interactive ligands #1141. *Proc Am Assoc Cancer Res* 42:213, 2001.
3. Kolonin MG, **Arap W**, Pasqualini R. Targeting physiological and pathological blood vessel formation with in vivo phage display #4416. *Proc Am Assoc Cancer Res* 42:822, 2001.

4. Oh YW, Mohiuddin I, Hong WK, Putnam J, **Arap W**, Pasqualini R. Bronchial and pulmonary artery perfusion of lung metastases #2193. Proc Am Assoc Cancer Res 42:407, 2001.
5. **Arap W**, Kolonin M, Trepel M, Baggerly K, Lahdenranta J, Giordano RJ, Cardó-Vila M, Yao V, Mintz PJ, Ardelt PU, Flamm A, Valtanen H, Weavind LM, Hicks M, Troncso P, Pollock RE, Botz GH, Bucana C, Koivunen E, Cahill D, Pentz RD, Do KH, Logothetis CJ, Pasqualini R. Towards mapping the human vasculature by in vivo phage display #2928. Proc Am Assoc Cancer Res 43:591, 2002.
6. Ardelt PU, Wood CG, Chen L, Mintz PJ, Wright KC, Logothetis CJ, Pasqualini R, **Arap W**. Targeting of urothelial cells with internalizing peptides #2072. Proc Am Assoc Cancer Res 43:417, 2002.
7. Cardó-Vila M, **Arap W**, Pasqualini R. Contrasting properties of integrin cytoplasmic domains revealed by phage display #4181. Proc Am Assoc Cancer Res 43:844, 2002.
8. Cardó-Vila M, **Arap W**, Pasqualini R. Isolation of signaling molecule involved in angiogenesis mediated by beta 5 integrin cytoplasmic domain. Department of Army, Era of Hope, September 2002.
9. Giordano RJ, Lahdenranta J, Shapiro L, **Arap W**, Pasqualini R. Mass spectroscopy analysis of metalloproteases from tumor blood vessels: Aminopeptidase-N (CD13) activity upon angiogenic factors as a model #918. Proc Am Assoc Cancer Res 43:183, 2002.
10. Marchio S, Lahdenranta J, Trepel M, Giordano RJ, Shapiro L, Schlingemann RO, Wesseling P, Oosterwijk E, Valdembri D, Nanus D, Bussolino F, Pasqualini R, **Arap W**. Aminopeptidase A regulates angiogenesis and endothelial cell function #917. Proc Am Assoc Cancer Res 42:183, 2002.
11. Oh YW, Mohiuddin I, Liu T, Hong WK, Putnam J, McDonald D, **Arap W**, Pasqualini R. Visualization of microvasculature development in pulmonary metastases #4453. Proc Am Assoc Cancer Res 43:898, 2002.
12. Vidal CI, Broaddus RR, Lu KH, Ellis LM, **Arap W**, Pasqualini R. Identification of molecular markers in ovarian cancer #3013. Proc Am Assoc Cancer Res 43:608, 2002.
13. Vidal CI, Mintz PJ, Broaddus R, Lu K, Ellis LM, **Arap W**, Pasqualini R. Identification of molecular markers in ovarian cancer. The University of Texas M.D. Anderson Cancer Center SPORE in Ovarian Cancer Internal Retreat, Houston, TX, May 24, 2002.
14. Vidal CI, Mintz PJ, Broaddus R, Lu K, Ellis LM, **Arap W**, Pasqualini R. Identification of molecular markers in ovarian cancer. 10<sup>th</sup> Spore Investigator's Workshop, Chantilly, VA, July 13-16, 2002.
15. Bover LC, Holbeck S, Scudiero DA, Sausville E, Pasqualini R, **Arap W**. Targeting the NCI 60-cell panel by biopanning and rapid analysis of selective interactive ligands #4574. Proc Am Assoc Cancer Res 44:1049, 2003.
16. Bover LC, Holbeck S, Scudiero DA, Zurita AJ, Sausville E, Pasqualini R, **Arap W**. Targeting the NCI 60-Cell panel by biopanning and rapid analysis of selective interactive ligands. AACR-NCI-EORTC international conference: Molecular targets and cancer therapeutics, 2003.
17. Cardó-Vila M, **Arap W**, Pasqualini R.  $\alpha$ V $\beta$ 5 Integrin-dependent programmed cell death triggered by a peptide mimic of annexin V. Gordon Conference, 2003.

18. Chen L, Giordano RJ, Ardelt PU, Pasqualini R, **Arap W**. A bi-specific phage system for target discovery and delivery in cancer #4554. Proc Am Assoc Cancer Res 44:1044, 2003.
19. Ellerby HM, Lee S, Andrusiak R, Ellerby LM, Chen SF, Kiyota T, del Rio G, Sugihara G, Bredesen DE, **Arap W**, Pasqualini R. A de novo designed protein with anti-tumor effects #6449. Proc Am Assoc Cancer Res 44:1478, 2003.
20. Hajitou A, Marini F, Lilley C, Moya C, Restel B, Arap M, **Arap W**, Pasqualini R. A new generation of targeted phage-based vectors for systemic gene delivery. Gordon Conference, 2003.
21. Kolonin MG, Saha PK, Chan L, Pasqualini R, **Arap W**. Therapeutic targets of prohibition in adipose tissue vasculature. ASCI/AAP Joint Meeting, 2003.
22. Lahdenranta J, Giordano RJ, Langley R, Fidler IJ, Pasqualini R, **Arap W**. Selection of phage libraries on lung endothelium-derived cells by BRASIL and in vivo validation of a homing-peptide to the pulmonary vasculature #2763. Proc Am Assoc Cancer Res 44:631, 2003.
23. Langley RR, Lahdenranta J, Giordano R, Ramirez K, Tsan R, **Arap W**, Pasqualini R, Fidler IJ. Phenotypic diversity of endothelial cells, #2957. Proc Am Assoc Cancer Res, 44:675, 2003.
24. Mintz P, Kim J, Do KA, Wang X, Zinner RG, Cristofanilli M, Arap MA, Hong WK, Troncoso P, Logothetis CJ, Pasqualini R, **Arap W**. Fingerprinting the circulating repertoire of antibodies from cancer patients #5629. Proc Am Assoc Cancer Res 44:1290, 2003.
25. Oh YW, Mohiuddin I, Sun C, Putnam JB Jr, Hong WK, **Arap W**, Pasqualini R. Vasculature diversity in experimental melanoma metastases #5850. Proc Am Assoc Cancer Res 44:1342, 2003.
26. Zurita AJ, Troncoso P, Logothetis CJ, Pasqualini R, **Arap W**. A ligand peptide with potential for targeting prostate cancer metastatic to bone marrow #1659. 11<sup>th</sup> Spore Investigators Workshop. Proc Am Assoc Cancer Res 44:376, 2003.
27. Jaalouk DE, Kuniyasu A, Marini F, Ranta RM, Giordano R, Bover L, Sun C, Koivunen E, **Arap W**, Pasqualini R. Identification of therapeutic targets for leukemia by phage display profiling of leukemia cell lines and clinical samples. 12<sup>th</sup> SPORE Investigators' Workshop, 2004.
28. Juliana B, Giordano RJ, Kellen F, Oshiro SE, Pasqualini R, **Arap W**, Jorge K, Guilherme L. Phage display study using heart-infiltrating t-cell population rich in CD4+ isolated from rheumatic heart disease patients. 2004.
29. Pasqualini R, **Arap W**. Targeted nanotracers for in vivo imaging and tissue ablation. Alliance for Nanohealth Workshop, 2004.
30. Zurita AJ, Hajitou A, Cardó-Vila M, Troncoso P, Logothetis CJ, Pasqualini R, **Arap W**. Preclinical development of an interleukin-11 receptor-targeted pro-apoptotic peptide against advanced prostate cancer #3190. 40th Annual Meeting of The American Society Of Clinical Oncology. Proc ASCO, 2004.
31. Alauddin MM, Hajitou A, Soghomonyan S, Ozawa MG, Balatoni J, Pasqualini R, **Arap W**, Gelovani J. Micro-pet imaging of HSV-tk gene delivery and expression with [18F]-feau in tumor-bearing mice. The International Society of Molecular Imaging, Copenhagen, Denmark, 2005.
32. Sharma P, Tang ND, **Arap W**, Pasqualini R. Combinatorial targeting of the NY-ESO-1 cancer Testis antigen. Cancer Research Institute, 2005.

33. Petrache I, **Arap W**, Pasqualini R, Flotte T, Tudor RM. Diagnostic and therapeutic applications of bacteriophage associated virus technologies in pulmonary emphysema. *Nanomedicine* 2:294, 2006.

**f. Book Chapters**

1. Koivunen E, Restel BH, Rajotte D, Lahdenranta J, Hagedorn M, **Arap W**, Pasqualini R. Integrin-binding peptides derived from phage display libraries. In Howlett AR, eds. *Meth Mol Biol*, Humana Press, Inc., 129:3-17, 1999.
2. Schneller M, **Arap W**, Pasqualini R. Immunoblotting of integrins. *Meth Mol Biol* 129:63-78, 1999.
3. Pasqualini R, **Arap W**. Phage displayed peptides as tools to explore vascular heterogeneity. In: J Martinez, JA Fehrentz (eds.), *Peptides*, pp. 26-30: EPS/Edicion EDK, 2001.
4. Pasqualini R, **Arap W**. Translation of vascular proteomics into individualized therapeutics. In: *Pharmacogenomics in Search for Individualized Therapies*, Wiley-VCH Press, pp. 525-530, 2002.
5. Pasqualini R, **Arap W**. Vascular targeting. In: *The Encyclopedia of Cancer*, Ed. Joseph R. Bertino, Academic Press Inc., New Brunswick, NJ, Second edition, Vol 4, pp. 501-7, 2002.
6. Pasqualini R, **Arap W**. Profiling the molecular diversity of blood vessels. *Cold Spring Harbor Symposia on Quantitative Biology*, Vol 67, pp. 223-5, 2002.
7. Kolonin M, Pasqualini R, **Arap W**. Mapping human vascular heterogeneity by in vivo phage display. In: *Genetics of Angiogenesis*, Ed. James B. Hoying, BIOS Scientific Publishers Ltd, Oxford, Ch.11: pp.181-187, 2003.
8. Vidal C, Cardó-Vila M, Lahdenranta J, **Arap W**, Pasqualini R. Targeting blood vessels in vivo by using phage display libraries. In: Syrigos, Harrington (eds.), *Targeted Therapy for Cancer*, pp. 250-255, 2003.
9. Lahdenranta J, **Arap W**, and Pasqualini R. The use of proteomics to map phenotypic heterogeneity of the endothelium. In: *Endothelial Cells In Health and Disease*, Eds. Aird W.C., Taylor & Francis, March 2005.
10. Christianson DR, Ozawa MG, Pasqualini R, **Arap W**. Techniques to decipher molecular diversity by phage display. In *Cardiovascular Proteomics book in Methods in Molecular Biology*, Humana Press. 357:385-406, 2006.
11. Trepel M, **Arap W**, Pasqualini R. Selection, isolation, and identification of targeting peptides for ligand-directed gene delivery. *Gene Transfer, Delivery and Expression of DNA and RNA: A Laboratory Manual*, Friedman & Rossi (eds), Cold Spring Harbor Laboratory Press: New York, NY, Chapter 30, pp. 359-369, 2007.
12. Cardó-Vila M, Vidal CI, Lahdenranta J, **Arap W**, Pasqualini R. Blood vessels as a target for cancer therapy. In: Syrigos, Harrington, eds. *Targeted Therapy for Cancer*. (In Press).
13. Zurita AJ, **Arap W**, Pasqualini R. Molecular characterization of the endothelium: A phage display perspective the endothelium. In: *A Comprehensive Reference, The Endothelial Cell as Input-Output Device/Output/Proteome*, Ed. Aird WC., Marcel Dekker Inc, 2005. (In Press).

**g. Books (edited and written)**

1. Pasqualini R, **Arap W** (eds.), Protein Discovery Technologies, Principles, Methods and Applications, Marcel Dekker/CRC Press, New York. (In Press).

**h. Letters to the Editor**

N/A

**i. Manuals, Teaching Aids, Other Publications**

1. Pasqualini R, **Arap W**, Rajotte D, and Ruoslahti E. In vivo selection of phage-display libraries. In: C. F. Barbas, III, D. R. Burton, J. K. Scott, and G. J. Silverman (eds.), Phage Display: A Laboratory Manual, Chapter 22, pp. 1-24, New York: Cold Spring Harbor Laboratory Press, 2000.

**j. Other**

N/A

**EDITORIAL AND REVIEW ACTIVITIES**

**Editor/Service on Editorial Board(s)**

Editor, Protein Discovery, CRC Press, 2001

Editor, Metalloproteases in Cancer, Landes Biosciences Inc., 2001

Editor, Frontiers in Bioscience, 2001

Editor, Cancer Biology and Therapy, 2001

AdHoc Reviewer

Cancer Cell

Cancer Research

Clinical Cancer Research

Endothelial Cell Research

FASEB Journal

Gene Therapy

Human Gene Therapy

International Journal of Cancer

Journal of Clinical Oncology

Journal of Urology

Nature Biotechnology

Nature Genetics

Nature Medicine

Nature Methods

Neoplasia

Proceedings of the National Academy of Sciences (USA)

The Pharmacogenomics Journal

Science

**TEACHING**

**Within Current Institution**

**Formal Teaching**

**Courses Taught**

Instructor, The University of Texas Medical School, Vascular Biology Course, 2000

Instructor, GS04 0043, Molecular Principles of Virology, 2004

**Training Programs**

Member, Virology and Gene Therapy, 1999 – Present

Program Mentor, CCSG – Cancer Biology & Metastasis Program, 1999 – Present

Program Mentor, Gene Targeting and Therapy Program, 1999 – Present

Program Mentor, GU Program, 1999 – Present

Program Mentor, Pharmacoinformatics Training Grant, 2004 – Present

Member, Vascular Biology, 2004 – Present

**Other Educational Programs (since relocation to the University of Texas M. D. Anderson Cancer Center)**

Lymphoma Research Conference, 2000

Bone Marrow Transplant Research Conference, 2000

Grand Rounds, Department of Cancer Medicine, 2000, 2001, 2004, 2005

The University of Texas M. D. Anderson Cancer Center Research Council, 2001

Leukemia Seminar Series, 2001

Department of Bioimmunotherapy Seminar, 2001

U-54 Program Grant, 2002, 2003, 2004

Prostate SPORE External Advisory Board Meeting, 2002, 2003, 2004

Information Exchange Seminar, Department of Cancer Genetics, 2005

Research Conference, Department of Lymphoma/Myeloma, 2006

**Supervisory Teaching**

**Advisory Committees and/or Supervisory Committees**

Mentor, Clinical Investigator Program, Jeri Kim, M.D., The University of Texas M. D. Anderson Cancer Center, 2000 – 2003

Member, Advisory and Supervisory Committee, G.S.B.S., Claudia Vidal (M.D., Ph.D.) 2000 - 2004

Tutorial Supervised, John Davis, 2001

Summer Tutorial Research Experiment, Joyce Philips, The University of Texas-Houston Medical School, Houston, TX, 2001

Summer Tutorial Research Experiment, Sharon Fernandez, The University of Texas-Houston Medical School, Houston, TX, 2001/2002

Tutorial Supervised, Catherine Moya, 2002 – 2006

Member, Advisory Committee, G.S.B.S., Catherine Moya (Ph.D.) 2003 – 2006

Tutorial Supervised, Dawn Christianson, 2004

Chair, Advisory Committee, G.S.B.S., Dawn Christianson (Ph.D.) 05/19/04 – Present

Arap/Pasqualini Laboratory Summer Research Program, Tracey Smith, Baylor University, Summer 2005



Co-Mentor, Physician-Scientist Program, Aarif Khakoo, M.D., The University of Texas M.D. Anderson Cancer Center, 2005 - 2006.

Arap/Pasqualini Laboratory Summer Research Program, Alicia L. Patterson, Massachusetts Institute of Technology, Summer 2006

Arap/Pasqualini Laboratory Summer Research Program, Shannon Nees, Massachusetts Institute of Technology, Summer 2006

Arap/Pasqualini Laboratory Summer Research Program, Jeffrey A. Easley, Massachusetts Institute of Technology, Summer 2006

Arap/Pasqualini Laboratory Summer Research Program, Julianna K. Edwards, Massachusetts Institute of Technology, Summer 2006

Arap/Pasqualini Laboratory Summer Research Program, Tracey Smith, Baylor University, Summer 2006

Arap/Pasqualini Laboratory Visiting Student, Laura Lattanzio, Institute for Cancer Research and Treatment, University of Turin Medical School, Candiolo, Italy, 2006

#### **Examining Committee Participation**

Chair, Claudia Vidal, 05/03/02

Chair, Catherine Moya, 02/20/06

Chair, Marina Cardó-Vila

Chair, Johanna Lahdenranta

#### **Supervisory Committees from Other Institutes**

Goran Mason, B.S., Graduate Student, Karolinska Institute, Sweden, 1998

Gordon Tang, M.D., Neurosurgery Fellow, Harvard Medical School, Boston, MA, 1998

Bradley Restel, B.S., Research Technician, Medical Student, University of Texas-San Antonio, San Antonio, TX, 1999 – 2001

Carlotta Cavazos, B. S., Research Technician, Physician-Assistant School, Baylor College of Medicine, Houston, TX, 1999 – 2001

Visiting Graduate Student, Olaf Broders, University of Heidelberg, Germany, 2000

Visiting Graduate Student, Margaret Magdesian, University of São Paulo, São Paulo, Brazil, 2000

Visiting Graduate Student, Mark LaBarge, Stanford University, Stanford, CA, 2001

Undergraduate Tutorial, Katherine Leskin, MIT, Summers 2003 and 2004

Graduate Student Tutorial, Fernanda Staquicini, University of São Paulo, 2004

Graduate Student Tutorial, Michael Stefanidakis, University of Helsinki, Finland, 2004

Johanna Lahdenranta, University of Helsinki, Finland

Marina Cardó-Vila, University of Barcelona, Spain

**Direct Supervision**

**Undergraduate and Allied Health Students**

N/A

**Medical Students**

Claudia Vidal, M.D., Ph.D. Program, 2002 – 2004, Surgical Resident, University of Pennsylvania

Michael Ozawa, M.D., Ph.D. Program, 2005 - present

**Graduate Students**

Marina Cardó-Vila, graduated 2003

Catherine Moya, 2003 – 2005

Johanna Lahdenranta, 1998-2004, graduated 2004

Dawn Christianson, 2004 – Present

Jessica Sun, 2005 – Present

Alessandro Kelien Lee, 2006 – Present

Tracey Smith, 2006 – Present

Danielle O'Connell, 2007 - Present

**Postdoctoral Research Fellows**

Virginia Yao, Ph.D., Postdoctoral Fellow, Senior Research Fellow, University of California, San Francisco, CA, 1999 – 2001

Paul Mintz, Ph.D., Postdoctoral Fellow, 1999 – 2003,  
Instructor, The University of Texas M. D. Anderson Cancer Center, 2003 - 2006  
Associate Professor, Imperial College, UK, 2006 - present

Martin Trepel, M.D., Postdoctoral Fellow, Assistant Professor, University of Freiburg, Germany, 2000 - 2001

Peter Ardelt, M.D., Postdoctoral Fellow, Urology Resident, Forschungszentrum Borstel, Germany, 2000 – 2002

Limor Chen, Ph.D., Postdoctoral Fellow, Senior Research Scientist, Dr. Robert Kerbel's Laboratory, Canada, 2000-2003

Mikhail Kolonin, Ph.D., Postdoctoral Fellow, 2000 – 2003  
Instructor, The University of Texas M. D. Anderson Cancer Center, 2003 – 2007  
Assistant Professor, Institute for Molecular Medicine, Houston, TX, 2007 - present

Amado Zurita, M.D., Postdoctoral Fellow, 2001 – 2007  
Assistant Professor, The University of Texas M. D. Anderson Cancer Center, 2007 - present

Marco Arap, M.D., Postdoctoral Fellow, 2002 – 2003  
Assistant Attending Physician and Assistant Professor of Urology USP, 2003 – present

Laura Bover, Ph.D., Postdoctoral Fellow, 2003 – 2004  
Research Scientist Immunology

Marina Cardó-Vila, Ph.D., Postdoctoral Fellow, 2003 – Present  
Susan G. Komen Fellow, 2006 – 2009

Glauco Souza, Ph.D., Postdoctoral Fellow, 2003 – Present  
Recipient of The Jay and Lori Eisenberg Endowed Fellowship  
Recipient of The Marion D. Edwards Fellowship

Diana Jaalouk, Ph.D., Postdoctoral Fellow, 2003 – 2006  
Recipient of the Kimberly Patterson Fellowship in Leukemia Research Award, 2006

Ricardo Giordano, Ph.D., Postdoctoral Fellow, 2004 – 2007  
Instructor, The University of Texas M. D. Anderson Cancer Center, 2007 – present

Liliana Guzman-Rojas, Ph.D., Postdoctoral Fellow, 2004 – Present

Johanna Lahdenranta, Ph.D., Postdoctoral Fellow, 2004 – 2005  
Postdoctoral Fellow, Harvard Medical School

Roberto Rangel, Ph.D., Postdoctoral Fellow, 2004 – Present  
Dr. Rangel is the recipient of the Scientific Achievement Fund for Odyssey Fellowship  
2006 – 2008

Fernanda Staquicini, University of São Paulo, 2004 - Present

Diana Noronha Nunes, Postdoctoral Fellow, 2006 – Present

Jami Mandelin, Postdoctoral Fellow, 2006 – Present

Jaesung Kim, Postdoctoral Fellow, 2007 – Present

Masanori Sato, Postdoctoral Fellow, 2007 - Present

#### **Clinical Residents and Fellows/Faculty**

Michael Wang, M.D., Assistant Professor, Department of Lymphoma, University of Texas M.  
D. Anderson Cancer Center, Houston, TX

Ziong Lee, M.D., Oncology Practice

Yun Oh, M.D., Assistant Professor, Thoracic/Head and Neck Medical Oncology, University  
of Texas M. D. Anderson Cancer Center, Houston, TX

Paul Mintz, Ph.D., Instructor, 1999 – Present

Mikhail Kolonin, Ph.D., Instructor, 2003 – Present

Padmanee Sharma, Assistant Professor, 2004 – 2005

Emmanuel Dias-Neto, Visiting Assistant Professor, 2006 – Present

Benjamin J. Moeller, 2007 – Present

#### **Visiting Scientists**

Luisa Villa, Ph.D., Professor, University of São Paulo, Brazil (Sabbatical)

Erkki Koivunen, Ph.D., Associate Professor of Biochemistry, University of Helsinki, Finland, 2000 – 2004

Serena Marchió, Ph.D., Graduate Student, University of Torino, Italy, 2000, 2004

Flavio Curnis, Ph.D., Graduate Student, San Raffaele H. Scientific Institute, Milan, Italy, 2000

Luiz Rizzo, M.D., Ph.D., Associate Professor of Immunology, University of São Paulo, Brazil, 2002 (Sabbatical)

Akihiko Kunyiasu, Associate Professor, Department of Biochemistry, Kumamoto University, Kumamoto, Japan, 2003 – 2004 (Sabbatical)

E. Helene Sage, Ph.D., Professor and Director, The Heart Hope Institute, Seattle, WA, 2003, 2004 (Sabbatical)

Emmanuel Dias Neto, Ph.D., Researcher and Deputy-director of the Laboratory of Neurosciences, Instituto de Psiquiatria - Faculdade de Medicina - Univ. de São Paulo, 2005 (Sabbatical)

Diana Nunez, Ph.D., Researcher and Deputy-director of the Laboratory of Neurosciences, Instituto de Psiquiatria - Faculdade de Medicina - Univ. de São Paulo, 2005 (Sabbatical)

Erkki Koivunen, Ph.D., Associate Professor of Biochemistry, University of Helsinki, Finland, 2005 (Sabbatical)

Houston Miller, Ph.D., Professor of Chemistry, George Washington University, Washington, DC, 2005 (Sabbatical)

Serena Marchio, Ph.D., Staff Scientist, APAvadis, Inc., Torino Italy/University of Torino, 2007

#### **Teaching Outside of Current Institution**

##### **Formal Teaching**

##### **Courses Taught**

Instructor, Ph.D. training program in translational bioengineering for cancer diagnostics and therapeutics, Rice University and the University of Texas M. D. Anderson Cancer Center, 2006

#### **CONFERENCES AND SYMPOSIA**

##### **Organization of National or International Conferences/Symposia (Including chairing session)**

Chair, Angiogenesis Regulation and Vascular Targeting Mini-symposium, American Association for Cancer Research, New Orleans, LA, 2001.

Chair, Angiogenesis Poster Session, American Association for Cancer Research, New Orleans, LA, 2001.

Chair, Department of Defense Prostate Cancer Consortium, The University of Texas M. D. Anderson Cancer Center, Houston, TX, 2002.

Chair, Department of Defense Prostate Cancer Consortium, San Francisco, CA, 2002.

Chair, Meet the Professor, 2003.

Chair, AACR, 2002 and 2004.

**Presentations at National or International Conferences**

**Invited Speaker (since relocation to The University of Texas M. D. Anderson Cancer Center)**

International Agency for Research on Cancer, Lyon, France, 01/99

Gordon Conference on Chemotherapy of Cancer, Colby Sawyer NH, 07/99

Swedish Society of Oncology, Nobel Forum, Karolinska Institute, Stockholm, Sweden, 04/00

American Society of Gene Therapy, 3<sup>rd</sup> Annual Meeting, Denver CO, 05/00

International Symposium on Apoptosis, Caxambu, Brazil, 08/00

M. D. Anderson International-España, Madrid, Spain, 11/00

Course on Phage Antibodies, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, 11/00

Symposium on Anti-Angiogenic Agents, Irving, TX, 01/01

Josef Steiner Foundation Symposium, Basel, Switzerland, 01/01

International Bladder Symposium, Washington, DC, 03/01

American Association for Cancer Research, New Orleans, LA, 03/01

Radiation Workshop, Roundtop, TX, 03/01

Annual Peptide Chemistry Symposium, Helsinki, Finland, 4/01

International Conference on Mechanisms of Cell Death and Disease, North Falmouth, MA, 06/01

American Urological Association, Anaheim, CA, 06/01

Forbeck Meeting in Vascular Permeability, Napa Valley, CA, 09/01

International Conference on Thrombosis and Hemostasis Issues in Cancer, Bergamo, Italy, 11/01

Annual Genitourinary Oncology Conference, The University of Texas M. D. Anderson Cancer Center, Houston, TX, 02/02

American Association for Cancer Research, 93<sup>rd</sup> Annual Meeting, San Francisco, CA, 04/02

Middle East Medical Assembly, Beirut, Lebanon, 05/02

International Conference of American Thoracic Society, Atlanta, GA, 05/02

FASEB Summer Research Conference, Molecular Biophysics of Cellular Membranes, Saxtons River, VT, 07/02

American Urological Association Renal Cell Carcinoma Meeting, Houston, TX, 08/02

Course on Phage Antibodies, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, 11/02

International Conference of the European Urology Association, Rotterdam, The Netherlands, 11/02

Interprostate SPORE Meeting, San Francisco, CA 12/02

U54 External Advisory Board Meeting, The University of Texas M. D. Anderson Cancer Center, Houston, TX, 01/03

Brain Tumor Center Seminar, The University of Texas M. D. Anderson Cancer Center, Houston, TX, 01/03

DOD Generals Meeting, Washington, DC, 02/03

1<sup>st</sup> Annual Opinion Leader Consortium on Novel and Targeted Therapies for Head and Neck Cancer, Isla Verde, Carolina, Puerto Rico, 02/03

NCI-JSPS Conference, Maui, HI, 02/03

New Direction in Cancer Research, Vintage Club Event, Indian Wells, CA, 03/03

3<sup>rd</sup> Annual UCSD-Salk-Nature Medicine "Days of Molecular Medicine Symposium", La Jolla, CA, 03/03

U.S. - Japan Cooperative Medical Science Program, Environment Genomics and Carcinogenesis Panel, Kyoto, Japan, 03/03

American Association for Cancer Research 97<sup>th</sup> Annual Meeting, Washington DC, 04/03

Radiation Workshop, Roundtop, TX, 04/03

2<sup>nd</sup> European Society of Combinatorial Sciences (ESCS) Society Symposium, Copenhagen, Denmark, 06/03

Gordon Research Conference: Angiogenesis and Microcirculation, Newport, RI, 08/03

International Meeting, 25<sup>th</sup> Anniversary of the Ludwig Institute for Cancer Research, São Paulo, Brazil, 08/03

Werner-Green Foundation International Symposium, Biology of Tumor Stroma: Potential Avenues in Tumor Therapy, Stockholm, Sweden, 09/03

Ludwig Institute Cancer Center, London, England, 10/03

Institutional Grand Rounds, The University of Texas M. D. Anderson Cancer Center, Houston, TX, 10/03

International Society of Biological Therapy of Cancers, 18<sup>th</sup> Annual Meeting, Bethesda, MD, 11/03

10<sup>th</sup> Annual CAPCURE Scientific Retreat, New York, NY, 11/03

New York Reception and Dinner, Harvard Club of New York, New York, NY, 11/03

Interdisciplinary Research Teams for Molecular Target Assessment, Boston, MA, 11/03

3<sup>rd</sup> Samsung-M. D. Anderson Clinical Cancer Symposium, Seoul, Korea, 12/03

Ethics Consensus Panel Meeting, Atlanta, GA, 02/04

Institutional Grand Rounds, The University of Texas M. D. Anderson Cancer Center, Houston, TX, 03/04

Cellular, Molecular, and Tumor Biology, 95<sup>th</sup> Annual AACR meeting, Orlando, FL, 03/04

Participated in the VP Extramural Programs Meeting, São Paulo, Brazil, 03/04

NCI Angiogenesis Workshop, Towson, MD, 05/04

U54 External Advisory Board Meeting, Houston, TX, 05/04

Alliance for NanoHealth Workshop, Texas Heart Institute, Denton Cooley Auditorium, Houston, TX, 05/04

The 5<sup>th</sup> Principal Investigators (PI) Meeting of the Innovative Molecular Analysis Technologies (IMAT) Program, San Diego, CA, 06/04

32<sup>nd</sup> Meeting of the International Society for Oncodevelopmental Biology and Medicine (ISOBM), Helsinki, Finland, 06/04

Gordon Research Conference, Molecular Therapeutics of Cancer, New London, NH, 07/04

12<sup>th</sup> SPORE Investigator's Workshop, Baltimore, MD, 07/04

Gordon Research Conference, Endothelial Cell Phenotypes in Health & Disease, Andover, NH 08/04

3<sup>rd</sup> International Symposium on Extracellular Matrix (SIMEC), Rio de Janeiro, Brazil, 09/04

2<sup>nd</sup> "Biologie Prospective" Santorini Conference, Santorini, Greece, 09/04

Division of Pathology and Laboratory Medicine Grand Rounds, The University of Texas M. D. Anderson Cancer Center, Houston, TX, 09/04

1<sup>st</sup> European Conference on Tumor Angiogenesis and Antiangiogenic Therapy, Munich, Germany, 10/04

M. D. Anderson & Imperial College, Texas-UK Collaborative Research Initiatives, Houston, TX, 10/04

10<sup>th</sup> Prouts Neck Prostate Cancer Meeting, Prouts Neck, Maine, 11/04

AACR: Basic, Translational, and Clinical Advances in Prostate Cancer, Bonita Springs, FL, 11/04

Symposium New Therapies in Cancer, Centro Nacional de Investigaciones Oncologicas, Madrid, Spain, 11/04

Imperial College, London, England, 11/04

Advances in Oncology Institutional Grand Rounds, The University of Texas M. D. Anderson Cancer Center, Houston, TX, 01/05

3<sup>rd</sup> Annual Opinion Leader Consortium on Novel and Targeted Therapies for Head and Neck Cancer, Cancun, Quintana Roo, Mexico, 02/05

Chair and Speaker, Institutional Grand Rounds: Cancer Viral Therapies: Untargeted Buggin, Houston, TX 04/05

Liver Cancer Institute, Fudan University, Shanghai, China, 05/05

Research Centre of Cancer, Faculty of Medicine, The University of Hong Kong, Hong Kong, 05/05

VI COPEM – São Paulo Congress on Endocrinology and Metabolism, São Paulo, Brazil, 05/05

87<sup>th</sup> ENDO 2005 Annual Meeting of The Endocrine Society, San Diego, CA, 06/05

12<sup>th</sup> Annual Scientific Retreat, Prostate Cancer Foundation, Phoenix, AZ, 09/05

Department of Biological and Technological Research of San Raffaele H Scientific Institute, Milan, Italy, 10/05

Institute for Cancer Research and Treatment, Candiolo, Torino, Italy, 10/05

Annual Advisory Board Meeting of the Prostate Cancer Research Program, Houston, TX, 11/05

6<sup>th</sup> Peter MacCallum Cancer Symposium, Melbourne, Australia, 11/05

Speaker, The University of Texas – Houston Medical School, 11/05

National Cancer Center Research Institute, Tokyo, Japan, 12/05

Sapporo Medical University School of Medicine, Sapporo, Japan, 12/05

Speaker, 2006 Miami Nature Biotechnology Winter Symposium, Days of Molecular Medicine: Angiogenesis in Cancer and Vascular Disease, Miami, FL, 02/06

Speaker, Present Project 7 Progress, Houston, TX, 02/06

Prostate SPORE Meeting, Houston, TX, 02/06

Speaker, Leukemia SPORE Meeting, Duarte, CA, 02/06

Speaker, The University of São Paulo, Radiation Oncology Program, São Paulo, Brazil, 3/06

Speaker, The University of Kumamoto, Kumamoto, Japan, 04/06

Speaker, The 2<sup>nd</sup> Latin American Conference on Lung Cancer, Cancun, Mexico, 4/06

Speaker, Western Review Consortium 2006 Peer Review Committee, Salt Lake City, UT, 04/06

Speaker, Department of Cellular and Integrative Physiology Seminar, Indianapolis, IN, 04/06

Speaker, The MDACC-Severance Symposium 2006, Seoul, Korea, 05/06

Speaker, University of Basel and University of Freiburg, Freiburg, Germany/Basel, Switzerland, 05/06

Speaker, Rockefeller University, New York, NY, 05/06

Speaker, BD Technologies, Research Triangle Park, NC, 05/06



Speaker, 2<sup>nd</sup> Annual M. D. Anderson Cancer Center Sister Institution Conference, Houston, TX, 06/06

Speaker, 2<sup>nd</sup> Joint American-Israeli Conference on Cancer: Novel Therapeutic Approaches to Cancer, Jerusalem, ISRAEL, 06/06

Speaker, 14<sup>th</sup> Spore Investigator's Workshop, Baltimore, MD, 07/06

Speaker, Aspen Seminar and Hines Reception, Aspen, CO, 07/06

Speaker, The V Foundation Awardees Annual meeting, Napa Valley, CA 07/06

Speaker, IGR-MDACC International Scientific Symposium/Sister Institution, Extramural Program, Paris, France, 09/06

Speaker, 4<sup>th</sup> Annual Angiogenesis & Vascular Targeting Agents Drug Discovery & Development World Summit, Boston, MA, 09/06

Speaker, Bastrop Veterinarian Team Meeting; GLP Pre-Clinical Work for Anticancer Peptides (For Spore and Leukemia Grant and IMPACT Grant), Bastrop, TX, 9/06

Speaker, Prostate Cancer Foundation 13<sup>th</sup> Annual Scientific Retreat, Scottsdale, AZ, 10/06

Speaker, Diagnosis and Therapeutic Discovery in Neuro-Oncology Conference, Houston, TX, 10/06

Speaker, Clontech, Mountain View, CA, 10/06

Speaker, A.C. Camargo/Sister Institution, Extramural Program, São Paulo, Brazil, 10/06

Speaker, Biogen, Boston, MA, 11/06

Speaker, 18<sup>th</sup> EORTC-NCI-AACR Symposium, Prague, Czech, Republic, 11/06

Speaker, 6<sup>th</sup> Edition of Amazon Project Conference on Cancer, Palermo, Italy, 11/06

Speaker, San Raffaele Hospital, Milan, Italy, 11/06

Speaker, AACR Prostate Cancer Conference, San Francisco, CA, 12/06

Speaker, Arap/Pasqualini Program Retreat, San Francisco, CA, 12/06

Speaker, Nano Medicine Annual Symposium, Helsinki, Finland, 01/07

Speaker, International Symposium on Polymer Therapeutics (ISPT 07), Berlin, Germany, 02/07

Speaker, 2007 Advances in Oncology: Emerging Trends, Targets, and Approaches to Solid Tumors Symposium, Houston, TX, 3/07

Speaker, Memorial-Sloan Kettering Cancer Center, Molecular Pharmacology & Chemistry Seminar, New York, NY, 3/07

Speaker, University of Texas M. D. Anderson Cancer Center, Leukemia Seminar Series, Houston, TX, 03/07

Keynote speaker, Frontiers of Cancer Nanotechnology Symposium, Atlanta, GA, 04/07

Speaker, Steele Laboratory Interactive Tumor Biology Seminar Series, Massachusetts General Hospital, Boston, MA, 04/07

Speaker, Stanford University, Palo Alto, CA, 4/07

Member, Odyssey Mini Symposium, Grand Rounds and Luncheon, The University of Texas M. D. Anderson Cancer Center, Houston, TX, 05/18/07

Speaker, American Society for Microbiology, General 107<sup>th</sup> Meeting, presented "Ligand-directed Vascular Targeting and molecular Imaging based on in vivo phage display Technology," Toronto, Ontario, Canada, 05/21-23/07

Speaker, BIT's 5<sup>th</sup> Anniversary, The Conference and Expo of International Drug Discovery Science and Technology (IDDST), China Roles for Global Drug Innovations, Shanghai, China, 05/27-05/31/07

3<sup>rd</sup> Annual M. D. Anderson Cancer Center Sister Institution Conference, Extramural Programs, The University of Texas, M. D. Anderson Cancer Center, Houston, TX, 06/06-08/07

Speaker, 2<sup>nd</sup> International Meeting of the European Society for Molecular Imaging (ESMI), Naples, Italy, 06/14/07-06/15/07

**Other, Including Scientific Exhibitions**

Gencell, Berkley, CA, 04/00

Elan Corporation, Dublin, Ireland, 09/00

Aventis, San Jose, CA, 02/01

AstraZeneca, Waltham, MA, 12/01

Becton Dickson, Durham, NC, 01/03

Novartis, San Diego, CA, 01/03

Abgenix, San Francisco, CA, 03/03

JMC/NTTX/Abgenix, Burnaby BC, Canada, 01/04

BD Technologies, Research Triangle Park, NC, 05/06

NCI Board of Scientific Counselors – Clinical Science and Epidemiology Meeting, Bethesda, MD, 11/06

NCI Board of Scientific Counselors – Clinical Science and Epidemiology Meeting, Bethesda, MD, 01/07

**Seminar Invitations from Other Institutions**

University of Texas Southwestern, Dallas, TX, 01/99

Free University Hospital, Amsterdam, The Netherlands, 02/99

Louisiana State University Medical Center, Shreveport, LA, 03/99

Scripps Research Institute, La Jolla, CA, 03/99

University of Vienna, Vienna, Austria, 08/99

Grand Rounds, Yale University, New Haven, CT, 05/00

Seminar Series, NIH/NCI, Therapeutics Program, Frederick, MD, 02/01

Stanford University, Stanford, CA, 05/01

Lerner Research Institute, Cleveland Clinic Foundation, Cleveland, OH, 06/01

NCI, Vascular Biology Faculty Retreat, Washington, DC, 02/02

Nanotechnology Symposium, Rice University, Houston, TX, 05/03

Program in Molecular Pathology, Johns Hopkins University, Baltimore, MD, 05/03

Dana-Farber Cancer Institute Genitourinary Oncology Seminar Series, Boston, MA, 06/03

Winship Cancer Institute, Emory University School of Medicine, Atlanta, GA, 08/04

Workshop on Biomedical Sensing and Imaging to the Nano-scale, Texas A&M University, College Station, TX, 10/04

Cancer Biology & Genetic Seminar, Memorial Sloan-Kettering Cancer Center Institute, New York, NY, 12/04

Grand Round, The City of Hope Comprehensive Cancer Center and Beckman Research Institute of the City of Hope, Duarte, CA, 01/05

Molecular & Cellular Biology Research Seminar Series, Sunnybrook & Women's Research Institute, Toronto, Ontario, Canada, 04/05

Anti-Angiogenesis in Oncology Seminar, Pfizer Global Research and Development Seminar, San Diego, CA, 04/05

University of Pittsburg, Department of Pathology Seminar Series, Pittsburg, PA, 06/05

Boston Children's Hospital/Harvard Medical School, Boston, MA, 09/05

University of Michigan, Cancer Focus Group, Ann Arbor, MI, 10/05

Massachusetts Institute of Technology, Cambridge, MA, 03/06

Winship Cancer Institute, Emory University School of Medicine, Atlanta, GA, 04/06

**Lectureships and Visiting Professorships**

University of Lübeck Medical School, Lübeck, Germany, 02/99

Institute of Pathology and Immunology of the University of Porto, Porto, Portugal, 04/00

Distinguished Investigator Lectureship Series, Winship Cancer Institute, Emory University, Atlanta, GA, 04/02

**Other Presentations at state and local Conferences**

N/A

**PROFESSIONAL MEMBERSHIPS/ACTIVITIES**

**Professional Society Activities, with Offices Held**

**National and International**

Member, American Society of Clinical Oncology (ASCO)

Member, American Society of Hematology (ASH)

Member, American Association for Cancer Research (AACR)

Member, American Medical Association (AMA)

Member, American Society for Clinical Investigation (ASCI) and "Young Turk"

Member, Society for Molecular Imaging

**Local/State**

N/A

**OTHER**

**Guest Lecturers hosted:**

Dr. Linda Shapiro, Associate Professor, St. Jude's Children's Hospital, Memphis, TN, Genitourinary Oncology Research Seminar Series, 10/00

Dr. Rubin Tudor, Associate Professor of Pathology, Johns Hopkins University, Baltimore, MD, Research Seminar Series, 9/01

Dr. Neil Pellis, Director of Research, Johnson's Space Center, NASA Houston, TX, Research Seminar Series, 9/01

Dr. Bruce Zetter, Professor of Cancer Biology, Harvard Medical School, Children's Hospital, Boston, MA, Genitourinary Oncology Research Seminar Series, 10/01

Dr. Steven K. Libutti, Senior Investigator, Surgery Branch, NCI, Bethesda, MD, Blaffer/Keck Seminar Series in Virology and Gene Therapy, 10/01

Dr. E. Helene Sage, Director, Division of Basic Science, The Hope Heart Institute, Seattle, WA, Genitourinary Oncology Research Seminar Series, 11/01

Dr. Donald McDonald, Professor of Anatomy, Cardiovascular Research Institute, University of California, San Francisco, CA, Genitourinary Oncology Research Seminar Series, 12/01

Dr. David A. Cheresh, Professor, Departments of Immunology and Vascular Biology, The Scripps Research Institute, La Jolla, CA, Genitourinary Oncology Research Seminar Series, 01/02

Dr. Houston Miller and Dr. Glauro Souza, George Washington University, Washington, DC, Genitourinary Oncology Research Seminar Series, 01/02

Dr. Richard C. Mulligan, Mallinckrodt Professor of Genetics, Department of Genetics, Harvard Medical School, Boston, MA, Blaffer/Keck Seminar Series in Virology and Gene Therapy, 04/02

Dr. Leonard A. Herzenberg, Professor of Genetics, Emeritus, Department of Genetics, Stanford University School of Medicine, Stanford, CA, Blaffer/Keck Seminar Series in Virology and Gene Therapy, 06/02

Dr. Leonore A. Herzenberg, Professor of Research, Department of Genetics, Stanford University School of Medicine, Stanford, CA, Genitourinary Oncology Research Seminar Series, 06/02

Dr. Sergio Lira, Director, Department of Immunology, Schering-Plough Research Institute, Kenilworth, NJ, Department of Cancer Biology Seminar Series, 06/02

Dr. Raghu Kalluri, Associate Professor, Beth Israel-Deaconess, Harvard Medical School, Boston, MA, 9/02

Dr. Luisa Villa, Director, Department of Virology, The Ludwig Institute for Cancer Research, Brazil, 10/03

Dr. Luiz V. Rizzo, Associate Professor, The Heart Institute, University of São Paulo, Brazil, 10/03

Dr. Lisa Coussens, Associate Professor, University of California-San Francisco, San Francisco, CA, 10/03

Dr. Pierre-Olivier Couraud, Professor, ISERM, France, 11/03

Dr. Kevin Burgess, Professor, Texas A & M University, College Station, Texas, 02/04

Dr. John Reed, President and CEO, The Burnham Institute, La Jolla, CA, 03/04

Dr. Kristina Vuori, Deputy Director, The Burnham Institute, La Jolla, CA, 03/04

Dr. Gilbert D. Loria Masis, Professor, University of Costa Rica, Department of Virology, School of Microbiology, San Jose, Costa Rica, 04/04

Dr. Amy Lee, Associate Director of Basic Research, USC/Norris Cancer Center, Los Angeles, CA, 05/04

Dr. Ricardo R. Brentani, President and CEO, The Ludwig Institute, São Paulo, Brazil, 06/04

Dr. Emmanuel Dias Neto, Researcher and Deputy-director of the Laboratory of Neurosciences, Instituto de Psiquiatria - Faculdade de Medicina - Univ. de São Paulo, 07/04

Dr. Lu Shan, Chemical Engineer, Department of Chemical Engineering, Stanford University, Stanford, CA, 07/04

Dr. Ricardo R. Brentani, President and CEO, The Ludwig Institute, São Paulo, Brazil, 07/04

Dr. Fabio C.L. Almeida, Associate Professor/Professor Adjunct, Federal University, Rio de Janeiro, Brazil, 09/04

Dr. Theresa Mary Allen, Professor, Department of Pharmacology, University of Alberta School of Medicine, Edmonton, Alberta, Canada, 03/05

Dr. Tong-Young Lee, Postdoctoral Fellow, Institute of Pathology, College of Medicine, National Taiwan University, Taipei, Taiwan, 04/05

Dr. Claudio A. Joazeiro, Group Leader, The Genomics Institute of the Novartis Foundation, San Diego, CA, 04/05

Dr. Keith L. March, Associate Professor, Department of Cellular and Integrative Physiology, Indiana University, Director, Indiana Center for Vascular Biology and Medicine, Associate Professor, Department of Biomedical Engineering, Purdue University, Indianapolis, IN, 06/05

Dr. Thomas C. Killian, Assistant Professor, Department of Physics and Astronomy, Rice University, Houston, TX, 9/05

Dr. Rebecca Rae Richards-Kortum, Professor, Department of Bioengineering, Rice University, Houston, TX, 10/05

Drs. Brian Freeman and Andrew Perlman, Great Point Ventures, Boston, MA, 10/05

Drs. Henrietta Kulaga and Jon Mogford, DARPA, Arlington, VA, 10/05

Dr. Paul J. Simmons, NHMRC Senior Research Fellow, Program Head in Stem Cell Biology, Director, Adult Stem Cell Platform, Peter MacCallum Cancer Centre, Stem Cell Centre, Melbourne, Australia, 12/05

Dr. Angela Papageorgiou, The University of Texas M.D. Anderson Cancer Center, Department of Cancer Biology, Houston, TX, 12/05

Alessandro Kelien Lee, Laboratory of Molecular Angiogenesis, IRCC – Institute of Cancer Research and Treatment, Candiolo (TO), Italy

Co-hosted, Brain Tumor Center Special Seminar invited speaker, Dr. Mark Noble, University of Rochester, School of Medicine and Dentistry, Rochester, NY, 12/05

Co-hosted, John H. Blaffer Lecture Series invited speaker, Dr. Robert Benezra, Memorial Sloan-Kettering Cancer Center, New York, NY, 12/05

Kris C. Wood, Ph.D. Candidate, Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA, 03/06

Dr. Chae-Ok Yun, Associate Professor, Institute for Cancer Research, Yonsei Cancer Center, Yonsei University of College of Medicine, Seoul, Korea, 03/06

Co-hosted, ERO Blaffer Visiting Professorship Lecture invited speaker, Dr. Richard Kolesnick, Head of the Laboratory of Signal Transduction of the Sloan-Kettering Institute, New York, NY, 03/06

Co-hosted, Dr. Alberto Bardelli, Associate Professor, Department of Oncological Sciences, University of Torino, School of Medicine, Torino, Italy, 03/06

Dr. Russell L. Finley, Jr., Associate Professor, Center for Molecular Medicine and Genetics, and Department of Biochemistry and Molecular Biology, Wayne State University School of Medicine, Detroit, MI, 03/06

Dr. Erik Henke, Research Fellow in Dr. Robert Benezra's Laboratory, Department of Cancer Biology and Genetics, Memorial Sloan-Kettering Cancer Center, New York, NY, 05/06

Dr. Masanori Soto, Staff Scientist, Biology Division, National Cancer Center Research Institute, Tokyo, Japan, 05/06

Dr. Satoshi Kawaguichi, Department of Orthopedic Surgery, Sapporo Medical University School of Medicine, Sapporo, Japan, 06/06

Dr. Angelo Corti, Head of Tumor Biology and Vascular Targeting Unit, DIBIT-San Raffaele H Scientific Institute, Milan, Italy, 08/06

Dr. Robin L. Anderson, Head, Cancer Biology Laboratory, Peter MacCallum Cancer Centre, Melbourne, Australia, 08/06

Eric Berger, Science Writer, Houston Chronicle, 08/06

Dr. Jaesung Kim, Institute for Cancer Research, Yonsei Cancer Center, Yonsei University College of Medicine, Republic of Korea, 09/06

Laura Lattanzio, Institute for Cancer Research and Treatment, University of Turin Medical School, Candiolo, Italy, 09/06

Dr. Randy J. Seeley, PhD, Department of Psychiatry, Genome Research Institute, University of Cincinnati, Cincinnati, OH, 04/07

Dr. E. Helene Sage, PhD, Member and Director, Hope Heart Program, Benaroya Research Institute at Virginia Mason, Seattle, WA, 05/07

## **CURRICULUM VITAE**

### **NAME**

Renata Pasqualini, Ph.D.

### **PRESENT TITLE AND AFFILIATION**

#### **Primary Appointment**

Professor of Medicine, Department of Genitourinary Medical Oncology  
Helen Buchanan and Stanley Joseph Seeger Research Professorship  
The University of Texas M. D. Anderson Cancer Center, Houston, Texas

#### **Dual/Joint Appointment**

Professor of Cancer Biology, Department of Cancer Biology

### **CITIZENSHIP AND VISA STATUS**

Brazilian, Italian, American

### **HOME ADDRESS**

1914 West Gray Avenue #308  
Houston, TX 77019  
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### **OFFICE ADDRESS**

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Department of Genitourinary Medical Oncology  
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Fax: (713) 745-2999  
E-mail: [rpasqual@mdanderson.org](mailto:rpasqual@mdanderson.org)

### **WEBSITE**

<http://www.mdanderson.org/labs/pasqualini/>

### **EDUCATION**

#### **Degree-Granting Education**

Ludwig Institute for Cancer Research, São Paulo Branch, Institute of Chemistry, University of São Paulo, 1990, Ph.D. in Biochemistry

#### **Postgraduate Training**

Postdoctoral Research Fellow, Cell Biology, Harvard Medical School, Joint Program in Neonatology, Boston, MA, Dr. Merton Bernfield, 1990-1991

Postdoctoral Research Fellow, Cellular and Molecular Biology, Harvard Medical School, Dana Farber Cancer Institute, Tumor Virology Division, Boston, MA, Dr. Martin Hemler, 1991-1994

Senior Research Fellow, Cellular and Molecular Biology, The Burnham Institute, La Jolla, CA, Dr. Erkki Ruoslahti, 1994-1996

### **CREDENTIALS**

#### **Board Certification**



**Licensure(s)**

Active: N/A

Inactive: N/A

**EXPERIENCE/ SERVICE**

**Academic Appointments**

Associate Professor, Department of Genitourinary Medical Oncology  
The University of Texas M. D. Anderson Cancer Center, Houston, Texas, 1999-2003

Assistant Professor, The Burnham Institute, La Jolla, California, 1997-1999

**Academic Administrative Appointments/Responsibilities**

N/A

**Institutional Committee Activities**

Member, The University of Texas-Houston Graduate School of Biomedical Sciences: Virology and Gene Therapy Program Committee, 2001 – Present

Member, Committee for the Review of The University of Texas M. D. Anderson Cancer Center Prostate Cancer SPORE Pilot Projects, 2001 – Present

Member, The University of Texas M. D. Anderson Cancer Center Prostate Cancer SPORE Executive Committee, 2001 – Present

Member, The University of Texas - Study Section Review Committee for Basic Research Projects, 2001 – 2003

Member, The University of Texas Postdoctoral Advisory Committee, 2001 – 2004

Member, The University of Texas M. D. Anderson Cancer Center Prostate Cancer SPORE External Advisory Committee, 2002 – Present

Member, Tissue Acquisition Committee, 2003 – Present

Member, Promotion and Tenure Committee, The University of Texas M. D. Anderson Cancer Center, 2003 – 2006

Member, DVMS Core Grant Program Income Advisory Committee, 2003 – Present

Member, Education Subcommittee, The University of Texas M. D. Anderson Cancer Center, 2004

Member, Experimental Therapeutics Search Committee, 2004 - 2005

Member, Extramural Programs Committee, The University of Texas M. D. Anderson Cancer Center, 2004

Member, Basic Sciences Research Symposium Planning Committee Meeting, 2004 – 2005

Member, DNA Sequencing Facility Managing Committee, 2004 – Present

Member, Internal Advisory Board Revised Report for the Department of Experimental Diagnostic Imaging, 2006

Member, Advisory Steering Committee, Department of Extramural Programs, The United States-Middle East Partnership for Breast Cancer Awareness Research, The University of Texas M. D. Anderson Cancer Center, 2007 – present

Host to Italian Consulate, Dr. Cristiano Maggipinto, 05/07

Host to Brazilian Consulate, Carlos Alberto de Azevedo Pimentel, Diplomat, 06/07

Member, Advisory Committee for Colby Suire, Graduate School of Biomedical Sciences, The University of Texas Health Science Center at Houston, Houston, TX, 06/07

**Other Appointments/Responsibilities**

**Media/Communications Activities**

**Television**

NBC Nightly news, KPRC-TV, Ch. 2. A story on M. D. Anderson's resurgence and rapid rise in patient growth. This story, which came as a direct result of the recent page-one Wall-Street Journal story, 2000.

CNN shooting with Dr. Mendelsohn, 2001.

Worked with PBS "NOVA" on an hour-long special on anti-angiogenesis and other new therapies, 2001.

7 News Boston, Diet Discovery,  
<http://www1.whdh.com/features/articles/healthcast/DBM203/>, 05/10/04.

ABC 13 Eyewitness News, Cancer research uncovers shot that could melt fat away,  
[http://abclocal.go.com/ktrk/health/051004\\_health\\_fatcells.html](http://abclocal.go.com/ktrk/health/051004_health_fatcells.html), 05/10/04.

NBC, Study: Weight-loss drug cuts fat tissues' blood supply in mice,  
<http://www.nbc5i.com/health/3288686/detail.html>, 05/10/04.

News 10, Fat Cells, <http://www.news10.com/Global/story.asp?S=1862161>, 05/12/04.

## Print

### National

New York Times, Patent Report, Method of Identifying molecules that home to a selected organ in vivo, 1996.

Business Week, Protein tags chase down tumors, 1996.

San Diego Tribune, Researchers report gains in molecular tag study, 1996.

S. Komen Press Release, The Susan G. Komen Breast Cancer Foundation Announces 1998 Postdoctoral Fellowship Grantees, 1998.

Appeared on the cover of M. D. Anderson's "Research Milestones" brochure, 2001.

Urology Times, Molecular 'map' will allow study of tissue markers: urothelial address mapping will enable targeted imaging, diagnosis, and therapy, 2001.

The New York Times Company, Science Times, How cells know where to exit the bloodstream to go to work, 2002.

Science Magazine, Biomedical Ethics: Study of brain dead sparks debate, <http://www.sciencemag.org/cgi/content/full/295/5558/1210>, 02/15/02.

News Release, M. D. Anderson researchers map "zip codes" in the human blood vessel system, 01/31/02.

ScienceNow, A new angle on targeted drug design, <http://sciencenow.sciencemag.org/cgi/content/full/2002/204/1>, 02/04/02.

Texas Medical Center News, Researchers identify "zip codes" in the human blood vessel system, [http://www.tmc.edu/tmcnews/02\\_15\\_02/page\\_15.html](http://www.tmc.edu/tmcnews/02_15_02/page_15.html), 02/15/02.

CancerWise, A publication of M. D. Anderson Cancer Center, Researchers Map "Zip Codes" in the human blood vessel system, [http://www.cancerwise.org/March\\_2002/print.cfm?id=E552EEEA-1357-47F9-B72DF4690515B2C5&method=DisplayFull](http://www.cancerwise.org/March_2002/print.cfm?id=E552EEEA-1357-47F9-B72DF4690515B2C5&method=DisplayFull), 03/02.

Doctor, doctor. Network, A Publication of the Anderson Network, 2002.

Chicago Tribune, Science seeks secrets of life in brain-dead, 2003.

Nature Biotechnology, Press Release, Zeroing in on cancer markers, 2003.

Emory Report, Bioethicist writes terminal-care research guidelines, 2003.

Genomics & Proteomics, Feature Article, With automated throughput, this robust technique finds utility from cancer research to biological agent detection, 2003.

Oncolog, A publication of M. D. Anderson Cancer Center, Proteomics may revolutionize cancer detection, staging, and prognosis, <http://www2.mdanderson.org/depts/oncolog/pdfs-issues/03/oncolog5-03.pdf>, 05/03.

The Wall Street Journal, A new tactic against obesity: Starve fat cells of blood supply, <http://www.unh.edu/journalism/fatcells.htm>, 05/10/04.

U.S. News and World Report, Science calls at the deathbed,  
<http://www.usnews.com/usnews/health/articles/040112/12dead.htm>, 01/12/04.

U.S. News & World Report, Cancer's fearsome travelers,  
<http://www.usnews.com/usnews/health/articles/040405/5cancer.b.htm>, 04/05/04.

Chemical & Engineering News, Chemical Highlights 2004,  
<http://pubs.acs.org/cen/coverstory/8251/8251chemistry.html>, 12/20/04.

The Boston Globe, Molecule found to trim fat in mice,  
[http://www.boston.com/yourlife/health/diseases/articles/2004/05/10/molecule found to trim fat in mice/](http://www.boston.com/yourlife/health/diseases/articles/2004/05/10/molecule_found_to_trim_fat_in_mice/), 05/10/04.

Nature Medicine, Magic bullets melt fat,  
<http://www.nature.com/nm/journal/v10/n6/full/nm0604-581.html>, 06/04.

Fat Mice News Release, Obesity reversed in mice by destroying blood vessels that service fat cells, 2004.

News & Views Nature Medicine 10, 581-582, Targeted ablation of the vasculature that feeds adipose tissue causes weight loss in mice, 2004.

Science in the News, Weekly, Anti-cancer technique may prove effective against fat, 2004.

NCI Score Report, Using vascular zip codes to aim at prostate tumors, 02/04.

Oncolog, A publication of M. D. Anderson Cancer Center, Translational research speeds the journey from lab results to clinical outcomes,  
<http://www2.mdanderson.org/depts/oncolog/articles/pf/04/3-mar/3-04-1-pf.html>, 03/04.

M. D. Anderson Cancer Center, News Release, Obesity reversed in mice by destroying blood vessels that service fat cells,  
<http://www.mdanderson.org/departments/newsroom/display.cfm?id=BCD494D1-3EBE-4D9E-945AD3CCFF7E0562&method=displayFull&pn=00c8a30f-c468-11d4-80fb00508b603a14>, 05/09/04.

Arizona Daily Star, Treatment for cancer could rid bodies of fat,  
<http://www.azstarnet.com/dailystar/relatedarticles/21434.php>, 05/10/04.

The Philadelphia Inquirer, New way to fight fat shows promise,  
<http://www.timesleader.com/mld/inquirer/living/health/8629242.htm>, 05/10/04.

Science Daily, Obesity reversed in mice by destroying blood vessels that service fat cells, 05/10/04.

Science in the News Weekly, Anti-cancer technique may prove effective against fat,  
<http://www.americanscientist.org/template/Newsletter?memberid=null&issueid=2921>, 05/11/04.

The Christian Post, Early stage anti-obesity drug shows promise,  
<http://www.christianpost.com/article/technology/91/early.stage.anti-obesity.drug.shows.promise/1.htm>, 05/12/04.

Chemical & Engineering News, Starving Fat,  
<http://pubs.acs.org/cen/news/8220/8220notw1.html>, 05/17/04.

FYI, A publication of M. D. Anderson Cancer Center, Obesity reversed in mice by destroying blood vessels that service fat cells,  
[www.mdanderson.org/pdf/fyi\\_05242004.pdf](http://www.mdanderson.org/pdf/fyi_05242004.pdf), 05/24/04.

Milwaukee Journal Sentinel, Team shrinks mice fat cells,  
<http://www.jsonline.com/alive/news/may04/231327.asp>, 05/24/04.

Lab Animal, Fat mice undergo 'molecular liposuction',  
<http://www.labanimal.com/labanimal/journal/v33/n7/full/labanimal0704-8c.html>, July/August 2004.

Inside M. D. Anderson - Messenger, Starving fat cells to fight obesity, published by the University of Texas M. D. Anderson Cancer Center,  
[http://inside.mdanderson.org/publications/messenger/July-August\\_2004/display.cfm?id=EAFE5A21-1933-4417-B7B9598F48B35230&method=displayFull](http://inside.mdanderson.org/publications/messenger/July-August_2004/display.cfm?id=EAFE5A21-1933-4417-B7B9598F48B35230&method=displayFull), July/August 2004.

GRP78 Press Release, Targeting stress response proteins on breast, prostate tumor cells shows promise, 09/20/04.

Johns Hopkins Medical Institution, \$10 million awarded to Johns Hopkins for studies of breast cancer spread,  
[www.hopkinsmedicine.org/breastcenter/documents/DoD\\_grant.pdf](http://www.hopkinsmedicine.org/breastcenter/documents/DoD_grant.pdf), 10/07/04.

Science News, Notes, Virus has the Midas touch, 2006

NanoBiotechnology News, Viral, gold nanoparticles can assemble themselves to potentially find and treat disease, 2006

Biophotonics, Adding gold to phage provides solid foundation for biosensors, 2006

[http://www.livescience.com/humanbiology/060324\\_nanoshuttles.html](http://www.livescience.com/humanbiology/060324_nanoshuttles.html)

Fox News, Drug Nanoshuttles to Target Specific Parts of Human Body,  
<http://www.foxnews.com/story/0,2933,189036,00.html>, 03/27/06

Houston Chronicle, Hybrid virus may help fight cancer, April 22, 2006.

ASBMB Today, New Hybrid Virus Provides Targeted Molecular Imaging of Cancer,  
[http://www.asbmb.org/asbmb/site.nsf/web/C3AA293D132C401F85257181004CF50D/\\$FILE/ASBMBToday-2006-6.pdf](http://www.asbmb.org/asbmb/site.nsf/web/C3AA293D132C401F85257181004CF50D/$FILE/ASBMBToday-2006-6.pdf), 06/06.

OncoLog News Brief, Targeting Molecular Imaging of Cancer,  
<http://www2.mdanderson.org/depts/oncolog>, 06/06.

## International

Newscientist, A new drug pins down tumours... then throttles them,  
<http://www.newscientist.com/article.ns?id=mg16321983.200>, 07/08/99.

Focus Das Moderne Nachrichtenmagazin, Forschung & Technik, Experiment im Sterben,  
Focus 8:128, 2002.

The Daily Mail, The flab dissolver; New drug is 'liposuction without surgery' say experts  
after trials show it can reduce body weight by a third,  
<http://www.highbeam.com/library/doc0.asp?docid=1G1:116421454>, 05/10/04.

Newscientist, Molecule cuts off fat's food supply,  
<http://newscientist.com/article.ns?id=dn4974>, 05/10/04.

International Healthcare Journal, Tackling obesity,  
[www.voyageur.co.uk/ihj/pdf/ihj\\_proof06.pdf](http://www.voyageur.co.uk/ihj/pdf/ihj_proof06.pdf), 06/04.

Scientific American Brasil, Terapia anticancer da origem a droga que destroi gordura,  
[http://www2.uol.com.br/sciam/conteudo/noticia/noticia\\_66.html](http://www2.uol.com.br/sciam/conteudo/noticia/noticia_66.html), 2004.

Textbook in Biology and Chemistry, Danish University of Pharmaceutical Sciences, Ed.  
Jasper Munck, 2005 (in Danish).

Folha de São Paulo, Ciencia, Brasileiro faz mistura capaz de achar célula doente no  
corpo, Banho de ouro cria vírus preciosos, 2006.

ISTOÉ, Ciencia, O vírus de ouro, 2006.

**Web only**  
**National**

The Burnham Institute, Scientists use cellular "area codes" to deliver cancer drug with reduced side effects, <http://www.burnham.org/NewsAndInformation/News/1-16-1998.asp>, 01/16/98.

The Burnham Institute, Target, pro-apoptotic peptides: A potential new class of anti-cancer agents, a practical solution to angiogenesis, <http://www.burnham.org/NewsAndInformation/News/9-10-1999.asp>, 09/10/99.

Hospital Practice, Neurodegenerative Disease and cancer: two sides of a coin? <http://www.hosprract.com/issues/2001/09/bred.htm>, 09/01.

Genome Biology, Vasculature mapping, [http://genomebiology.com/researchnews/default.asp?arx\\_id=gb-spotlight-20020213-02](http://genomebiology.com/researchnews/default.asp?arx_id=gb-spotlight-20020213-02), 02/13/02.

Science Blog, Novel Approach shows promise for a blood test, <http://www.scienceblog.com/community/older/2002/B/20026718.html>, 12/02.

Prostate Cancer Week, Study: Blood test may help evaluate prostate cancer disease progression, <http://www.prostatecancerweek.org/members/vol3/News/030102.htm>, 01/05/03.

MSNBC, New cancer technique useful against fat? <http://msnbc.msn.com/id/4939358>, 05/10/04.

Bio.com, Obesity reversed in mice by destroying blood vessels that service fat cells, [http://www.bio.com/news/features/newsfeatures\\_research.jhtml?cid=700040](http://www.bio.com/news/features/newsfeatures_research.jhtml?cid=700040), 05/10/04.

Science Now, Hunting down cancer, <http://sciencenow.sciencemag.org/cgi/content/full/2004/923/4>, 09/23/04.

Medical News Today, New wonder drug starves fat and makes you lose 30% of your body weight, <http://www.medicalnewstoday.com/index.php?newsid=8172>, 05/11/04.

College of American Pathologists, Swinging for the fences with prostate cancer tissue bank, [http://www.cap.org/apps/docs/cap\\_today/feature\\_stories/0204Prostate.html](http://www.cap.org/apps/docs/cap_today/feature_stories/0204Prostate.html), 02/04.

DrugResearcher.com, peptide blasts fat cells in obese mice, <http://www.drugresearcher.com/news/news-NG.asp?n=52542-peptide-blasts-fat>, 02/06/04.

Washington University School of Medicine in St. Louis, Cancer's fearsome travelers, <http://wuphysicians.wustl.edu/newsArchive.asp?navID=&ID=413>, 04/05/04.

EurekAlert, Obesity reversed in mice by destroying blood vessels that service fat cells, [http://www.eurekalert.org/pub\\_releases/2004-05/uotm-ori050704.php](http://www.eurekalert.org/pub_releases/2004-05/uotm-ori050704.php), 05/09/04.

Signonsandiego, Molecule 'vacuums up' fat from mice – U.S. study, <http://www.signonsandiego.com/news/health/20040509-0700-science-fat.html>, 05/09/04.

Americans for Medical Progress, Obesity reversed in mice by destroying blood vessels that service fat cells, <http://www.amprogress.org/News/News.cfm?ID=615&c=62>, 05/10/04.

BrightSurf.com, Obesity reversed in mice by destroying blood vessels that service fat cells, [http://www.brightsurf.com/news/may\\_04/EDU\\_news\\_051004.php](http://www.brightsurf.com/news/may_04/EDU_news_051004.php), 05/10/04.

CV News, Novel peptide treatment reverses obesity in mice, <http://www.crestor.info/index.asp?did=3441&aid=32189&l1=6&l2=0&ch=CV+News>, 05/10/04.

Guardian Unlimited, Want to be slim? Cut your blood supply, [http://www.tmc.edu/tmcnews/02\\_15\\_02/page\\_15.html](http://www.tmc.edu/tmcnews/02_15_02/page_15.html), 05/10/04.

HealthNews, Obesity reversed in mice by destroying blood vessels that service fat cells, <http://www.healthnews.ws/index.aspx?id=2214>, 05/10/04.

The Mail Online, 'Fat-zapping' drug could combat obesity, [http://www.mailonsunday.co.uk/pages/live/articles/health/dietfitness.html?in\\_article\\_id=301308&in\\_page\\_id=1798](http://www.mailonsunday.co.uk/pages/live/articles/health/dietfitness.html?in_article_id=301308&in_page_id=1798), 05/10/04.

Medi Lexicon, Obesity reversed in mice by destroying blood vessels that service fat cells, <http://www.medilexicon.com/medicalnews/php?language=&newsid=8098>, 05/10/04.

Medical News Today, Obesity reversed in mice by destroying blood vessels that service fat cells, <http://www.medicalnewstoday.com/index.php?newsid=8098>, 05/10/04.

News-Medical.net... Strategy to treat obesity through molecular liposuction, <http://www.news-medical.net/?id=1395>, 05/10/04.

Newswise, Obesity reversed in mice by destroying blood vessels, <http://www.newswise.com/articles/view/504903/>, 05/10/04.

ScientificAmerican.com, Cutting off blood supply to fat cells slims obese mice, <http://www.sciam.com/article.cfm?chanID=sa003&articleID=0007686A-F4AD-109B-B4AD83414B7F0000>, 05/10/04.

Slashdot, Molecule cuts off fat's food supply, <http://science.slashdot.org/article.pl?sid=04/05/11/0022203&threshold=4&mode=nested&commentsort=0>, 05/10/04.

SurgeryNews.net, Blood feud kills off fat cells, <http://www.surgerynews.net/news/0504/fat50404.htm>, 05/10/04.

SurgeryNews.net, Strategy to treat obesity through molecular liposuction, <http://www.surgerynews.net/news/0604/lipo060401.htm>, 05/10/04.

WebMD Health, Obesity treatment makes fat vanish, <http://my.webmd.com/content/article/86/99202.htm?lastselectedgid=%7B5FE84E90-BC77-4056-A91C-9531713CA348%7D>, 05/10/04.

WebMD Medical News, Obesity treatment makes fat vanish, [http://webcenter.health.webmd.netscape.com/content/Article/86/99202.htm?z=1728\\_000\\_00\\_1000\\_nb\\_01](http://webcenter.health.webmd.netscape.com/content/Article/86/99202.htm?z=1728_000_00_1000_nb_01), 05/10/04.

Wired News, Blood feud kills off fat cells, [http://www.wired.com/news/medtech/0%2C1286%2C63388%2C00.html?tw=wn\\_tophead\\_4](http://www.wired.com/news/medtech/0%2C1286%2C63388%2C00.html?tw=wn_tophead_4), 05/10/04.



British Nursing News Online, Want to be slim? Cut your blood supply, [http://www.bnn-online.co.uk/news\\_datesearch.asp?page=4&SearchDate=11/May/2004&Year=2004,05/10/04](http://www.bnn-online.co.uk/news_datesearch.asp?page=4&SearchDate=11/May/2004&Year=2004,05/10/04).

Better Humans, Starving fat cells could treat obesity drug kills cells that feed fat tissue, <http://www.betterhumans.com/News/news.aspx?articleID=2004-05-11-1>, 05/11/04.

Biological Procedures Online, Obesity reversed in mice by destroying blood vessels that service fat cells, <http://www.biologicalprocedures.com/bpo/general/news/040510/05.htm>, 05/11/04.

Biological Psychology, Mice fight the flab, <http://www.biopsychology.com/index.php?id=Mice+fight+the+flab&x=17&y=10&type=search>, 05/11/04.

Health Central, Liposuction in a pill? [http://www.healthcentral.com/PrinterFriendly\\_hc/drdean/408/60848.html](http://www.healthcentral.com/PrinterFriendly_hc/drdean/408/60848.html), 05/11/04.

Health on the Net, Health highlights, New therapy appears to reverse obesity in mice, <http://www.hon.ch/News/HSN/518885.html>, 05/11/04.

Indiana Organ Donation Organization, Starving fat cells could treat obesity, [http://www.iopo.org/news\\_detail.asp?ID=191](http://www.iopo.org/news_detail.asp?ID=191), 05/11/04.

VIDYYA, Obesity reversed in mice by destroying blood vessels that service fat cells, [http://www.vidyya.com/vol6/v6i131\\_1.htm](http://www.vidyya.com/vol6/v6i131_1.htm), 05/11/04.

True Star Health, Early stage anti-obesity drug shows promise, [http://www.truestarhealth.com/members/cm\\_archives03ML3P1A42.html](http://www.truestarhealth.com/members/cm_archives03ML3P1A42.html), 05/12/04.

Cancer Patients Aid Association, Next era of cancer therapy aims to separate cancer from blood supply, [http://www.cpaaindia.org/infocentre/clipping\\_gen\\_2.htm](http://www.cpaaindia.org/infocentre/clipping_gen_2.htm), 05/16/04.

MedScape, Reversal of obesity by targeted ablation of adipose tissue, <http://www.medscape.com/viewarticle/481335>, 06/24/04.

Coalition for Medical Progress, Deadly accurate cancer missile, [http://www.medicalprogress.org/benefits/breastcan/news.cfm?news\\_id=168](http://www.medicalprogress.org/benefits/breastcan/news.cfm?news_id=168), 08/10/04.

Consulting Room, Obesity reversed in mice by destroying blood vessels that service fat cells, <http://www.consultingroom.com/Aesthetics/news/Display.asp?id=916>, 09/05/04.

Medical News Today, Targeting stress response proteins of breast, prostate tumor cells shows promise, <http://www.medicalnewstoday.com/medicalnews.php?newsid=13738#>, 09/21/04.

News-Medical.net, Stress response proteins offer a promising target for a novel drug guidance system, <http://www.news-medical.net/?id=4951>, 09/21/04.

The Stress of Life.com, Targeting stress response proteins on breast, prostate tumor cells shows promise, <http://thestressoflife.com/date.htm>, 09/27/04.

Clinical Proteomics, \$10M quest for the molecular markers of breast metastasis, <http://proteomics.cprmap.com:8090/forums/showthread.php?t=11591>, 10/08/04.

Johns Hopkins Medicine, \$10 million awarded to Johns Hopkins for studies of breast cancer spread, [http://www.hopkinsmedicine.org/Press\\_releases/2004/10\\_09\\_04.html](http://www.hopkinsmedicine.org/Press_releases/2004/10_09_04.html), 10/08/04.

RT Image, \$10 million awarded for studies of breast cancer spread, <http://www.rt-image.com/content=9004J05C4896B88640569C74448080441>, 10/25/04.

Veritas Medicine for Patients, Update on Obesity: Partial answers to heavy questions, [http://www.veritasmedicine.com/d\\_home.cfm?type=WU&did=6&ml=1](http://www.veritasmedicine.com/d_home.cfm?type=WU&did=6&ml=1), 01/14/05.

PancreasWeb.com, Targeting pancreatic islets with phage display assisted by laser pressure catapult microdissection, 2005.

Medical News Today, Viral, Gold Nanoparticles Can Assemble Themselves To Potentially Find And Treat Disease, <http://www.medicalnewstoday.com>, 1/06.

Medical News Today, Viral, Gold Nanoparticles Can Assemble Themselves To Potentially Find And Treat Disease, <http://www.medilexicon.com>, 1/06.

Medical News Today, Viral, Gold Nanoparticles Can Assemble Themselves To Potentially Find And Treat Disease, <http://www.hospitalsworldwide.com>, 1/06.

[http://dsc.discovery.com/news/briefs/20060206/nanoshuttle\\_tec.html](http://dsc.discovery.com/news/briefs/20060206/nanoshuttle_tec.html), 1/06.

Newswise, Viral, Gold Nanoparticles Can Assemble Themselves to Find, Treat Disease, <http://www.newswise.com/articles/view/517439/>, 01/20/06.

BIO.COM: Biotechnology & Pharmaceutical News, Viral, Gold Nanoparticles Can Assemble Themselves to Potentially Find and Treat Disease <http://www.bio.com/realm/research.jhtml?realmId=5&cid=16200041>, 01/23/06.

Eurekalert.org, Viral, gold nanoparticles can assemble themselves to potentially find and treat disease, [http://www.eurekalert.org/pub\\_releases/2006-01/uotm-vgn012006.php](http://www.eurekalert.org/pub_releases/2006-01/uotm-vgn012006.php), 01/23/06.

M. D. Anderson Cancer Center, Viral, Gold Nanoparticles Can Assemble Themselves to Potentially Find and Treat Disease, <http://www.mdanderson.org/departments/newsroom/display.cfm?id=8fa45286-2920-464e-9a7fc76cfa93db72&method=displayfull&pn=00c8a30f-c468-11d4-80fb00508b603a14>, 01/23/06.

Nanotechnology.com news, Viral, gold nanoparticles can assemble themselves to potentially find and treat disease, <http://www.nanotechnology.com/news/index.php?search=souza&p=&x=0&y=0>, 01/23/06.

Nanomedicine Literature, Networks of gold nanoparticles and bacteriophage as biological sensors and cell-targeting agents. <http://www.nano-biology.net/showabstract.php?pmid=16434473>, 01/23/06.

RxPG News, Drug Delivery - Using biologically compatible materials to fabricate a nanoshuttle, [http://www.rxpgnews.com/research/biotechnology/drugdelivery/printer\\_3254.shtml](http://www.rxpgnews.com/research/biotechnology/drugdelivery/printer_3254.shtml), 01/24/06.

Whatsnextnetwork.com, What's Next In Health - Viral, Gold Nanoparticles Can Assemble Themselves to Potentially Find and Treat Disease  
<http://www.whatsnextnetwork.com/health/index.php/2006/01/25/p1733>, 01/25/06.

What's Next In Science & Technology, Viral, Gold Nanoparticles Can Assemble Themselves to Potentially Find and Treat Disease,  
[http://www.whatsnextnetwork.com/technology/index.php/2006/01/25/viral\\_gold\\_nanoparticles\\_can\\_assemble\\_th](http://www.whatsnextnetwork.com/technology/index.php/2006/01/25/viral_gold_nanoparticles_can_assemble_th), 01/25/06.

The World Health Network - Anti-Aging and Longevity, Viral, Gold Nanoparticles Can Assemble Themselves to Find, Treat Disease, <http://www.worldhealth.net/p/viral-gold-nanoparticles-can-assemble-themselves-to-find-treat-disease-2006-01-25.html>, 01/25/06.

Nanowork News, Networks of gold nanoparticles and bacteriophage as biological sensors and cell-targeting agents, <http://www.nanowerk.com/news/newsid=239.php>, 01/25/06.

AZoNano.com - The A to Z of Nanotechnology, Gold Nanoshuttle Seeks Out and Treats Disease, <http://www.azonano.com/news.asp?newsID=1790>, 01/25/06.

Medical News Today, Viral, Gold Nanoparticles Can Assemble Themselves To Potentially Find And Treat Disease  
<http://www.medicalnewstoday.com/medicalnews.php?newsid=36582>, 01/26/06.

Medilexicon.com, Viral, Gold Nanoparticles Can Assemble Themselves To Potentially Find And Treat Disease, <http://www.medilexicon.com/medicalnews.php?newsid=36582>, 01/26/06.

American Academy of Anti-aging Medicine, Viral, Gold Nanoparticles Can Assemble Themselves to Find, Treat Disease, <http://www.freerepublic.com/focus/f-chat/1564323/posts>, 01/27/06.

Nanotechnology.net, Viral, Gold Nanoparticles Can Assemble Themselves to Find and Treat Disease, <http://www.nanotechnology.net/index.aspx?ID=69125>, 01/30/06.

NCI Alliance for Nanotechnology, Nanotech News – Gold Nanoparticle-Virus Networks Work as Intracellular Sensors and Targeting Agents  
[http://nano.cancer.gov/news\\_center/nanotech\\_news\\_2006-02-06c.asp](http://nano.cancer.gov/news_center/nanotech_news_2006-02-06c.asp), 02/06/06.

Discovery Channel News, Nanoparticles Pair Up to Fight Disease,  
[http://dsc.discovery.com/news/briefs/20060206/nanoshuttle\\_tec.html](http://dsc.discovery.com/news/briefs/20060206/nanoshuttle_tec.html), 02/10/06.

#### **International**

Alianca de Medicos Contra o Cancer, Mapa do sistema vascular,  
<http://www.amcc.com.br/final/editorial.asp?CodigoNews=32>, 11/02.

Science News, Researchers present the "molecular liposuction,"  
[http://tools.search.yahoo.com/language/translation/translatedPage.php?tt=url&text=http%3a//science.orf.at/science/news/113398&lp=de\\_en](http://tools.search.yahoo.com/language/translation/translatedPage.php?tt=url&text=http%3a//science.orf.at/science/news/113398&lp=de_en), 05/04/04.

BBC Brasil.com, Nova droga bloqueia alimentacao de celulas gordurosas,  
[http://www.bbc.co.uk/portuguese/ciencia/story/2004/05/040510\\_gorduraml.shtml](http://www.bbc.co.uk/portuguese/ciencia/story/2004/05/040510_gorduraml.shtml), 05/10/04.

BBC News, Drug zaps fat into oblivion,  
<http://newsvote.bbc.co.uk/mpapps/pagetools/print/news.bbc.co.uk/1/hi/health/3699741.stm>, 05/10/04.

Daily Mail, 'Fat-zapping' drug could combat obesity,  
[http://www.dailymail.co.uk/pages/live/articles/health/dietfitness.html?in\\_article\\_id=301308&in\\_page\\_id=1798](http://www.dailymail.co.uk/pages/live/articles/health/dietfitness.html?in_article_id=301308&in_page_id=1798), 05/10/04.

Guardian Unlimited, Want to be slim? Cut your blood supply,  
<http://www.guardian.co.uk/medicine/story/0,11381,1213096,00.html>, 05/10/04.

News.Scotsman.com, Obese patients treated in groups to meet NHS targets,  
<http://news.scotsman.com/uk.cfm?id=531682004>, 05/10/04.

Prensa Latina, Cancer strategy could be used to treat obesity,  
<http://www.prensalatinaenglish.com/Article.asp?ID={B1799925-9B4B-4802-A651-2C3DFE137C49}&language=EN>, 05/10/04.

DerStandard.at, Artificial protein lets fat pads melt and makes healthier – with mice,  
<http://translate.google.com/translate?hl=en&sl=de&u=http://derstandard.at/standard.asp%3Fid%3D1660711&prev=/search%3Fq%3DKolonin%2Bmikhail%2Btexas%26start%3D10%26hl%3Den%26lr%3D%26ie%3DUTF-8%26sa%3DN>, 05/11/04.

Focus.it, Obesity, arrives the killer of the cells of fat person,  
[http://translate.google.com/translate?hl=en&sl=it&u=http://www.focus.it/notizie/15474\\_115\\_41.asp&prev=/search%3Fq%3DKolonin%2Bmikhail%2Btexas%26hl%3Den%26lr%3D%26ie%3DUTF-8](http://translate.google.com/translate?hl=en&sl=it&u=http://www.focus.it/notizie/15474_115_41.asp&prev=/search%3Fq%3DKolonin%2Bmikhail%2Btexas%26hl%3Den%26lr%3D%26ie%3DUTF-8), 05/12/04.

Food Policy Forum, New wonder pill cuts body fat by 30% in one month,  
<http://www.foodpolicyforum.co.uk/2004/05/new-wonder-pill-cuts-body-fat-by-30-in.html>, 05/18/04.

ISTOE, Novos ataques contra a gordura,  
[http://www.terra.com.br/istoe/1806/medicina/1806\\_ataques\\_contra\\_gordura\\_01.htm](http://www.terra.com.br/istoe/1806/medicina/1806_ataques_contra_gordura_01.htm), 05/19/04.

Instituto "Carlo De Martino" per la Formazione al Giornalismo - Associazione Walter Tobagi, Un "nanoshuttle" d'oro contro i batteri,  
<http://www.ifgonline.it/pub/165/show.jsp?id=296&iso=1&is=165>, 01/23/06.

EXPLORA - La TV delle Scienze, Un bio-shuttle tutto d'oro,  
[http://www.explora.rai.it/online/doc\\_news.asp?news\\_id=1008](http://www.explora.rai.it/online/doc_news.asp?news_id=1008), 01/24/06.

Benvenuti nel sito Le Scienze.it, Un bio-shuttle tutto d'oro *Lo "scafo" viene fatto costruire direttamente dal virus*  
[http://www.extrapola.com/app/WebObjects/Content.woa/WebRawNews/2006/January/24/67145858/Benvenuti\\_nel\\_sito\\_Le\\_Sci.html](http://www.extrapola.com/app/WebObjects/Content.woa/WebRawNews/2006/January/24/67145858/Benvenuti_nel_sito_Le_Sci.html), 01/24/06.

Energia Ambiente, Il *nanoshuttle* – Indice,  
<http://www.eniscuola.net/appuntamenti.aspx?id=181>, 01/25/06.

Ivanhoe's Medical Breakthroughs, Nanoshuttle Destroys Disease  
[http://www.ivanhoe.com/channels/p\\_channelstory.cfm?storyid=13025](http://www.ivanhoe.com/channels/p_channelstory.cfm?storyid=13025), 01/31/06.

Ciência em Dia - UOL Blog, Banho de ouro cria vírus preciosos  
<http://cienciaemdia.zip.net/>, 02/09/06.

UOL Lição de Casa, Nanotecnologia e engenharia genética, Banho de ouro cria vírus precioso,  
<http://noticias.uol.com.br/licaodecasa/materias/medio/atualidades/ult1685u224.jhtm>,  
02/09/06.

UOL Vestibular, Banho de ouro cria vírus precioso,  
<http://vestibular.uol.com.br/atualidades/ult1685u224.jhtm>, 02/09/06.

ISTOÉ Online, O vírus de ouro, [http://www.terra.com.br/istoe/1896/1896\\_sumario.htm](http://www.terra.com.br/istoe/1896/1896_sumario.htm),  
02/22/06.

[http://cienciaemdia.zip.net/arch2006-05-01\\_2006-05-31.html](http://cienciaemdia.zip.net/arch2006-05-01_2006-05-31.html), 2006

<http://www.medpagetoday.com/HematologyOncology/OtherCancers/tb>, 2006

[http://www.eurekalert.org/pub\\_releases/2006-04/uotm-nhv042006.php](http://www.eurekalert.org/pub_releases/2006-04/uotm-nhv042006.php)

<http://www.sciencedaily.com/releases/2006>

<http://www.asbmb.org/asbmb/site.nsf>, 2006

<http://www.aacr.org/home/scientists/meetings--workshops/special-conferences/previous-special-conferences/innovations-in-prostate-cancer-research.aspx>, 2006

#### **Other**

Hosted former President George Bush and Dr. Mendelsohn in the lab for video to be used for internal purposes as well as media distribution, 2001.

NPR, Science Friday, Morning Edition, Scientists optimistic over fat buster,  
<http://www.npr.org/templates/story/story.php?storyId=1890304>, 05/10/04.

The PNAS website receives almost 2 million hits every week and in 2004 over 10 million article pdfs were downloaded. This article was among the top 100 articles accessed. Pasqualini R and Arap W. Hybridoma-free generation of monoclonal antibodies. Proc Natl Acad Sci USA 101:257-9, 2004.

#### **Office of Development**

Prostate Cancer Research Program, Office of Development Fund Raising, Indian Wells, CA, 2000.

Gillson-Longenbaugh Foundation Luncheon, 2001 – 2004.

New York Reception and Dinner, hosted by Michael Bartolotta, Board of Visitors Member, Harvard Club of New York, New York, NY, 11/03.

Participated with MDACC, Dr. Mendelsohn and the Office of Development, International Center, in the Turkish Minister of Health Site Visit, 04/04.

Dr. Robert Cohen/Marcus Foundation Site Visit, Houston, TX, 06/04.

Participated with MDACC, Dr. Mendelsohn and the Office of Development in the Bert Fields (Investment Banking and Oil) Site Visit, 01/23/05.

Participated with MDACC, Dr. Mendelsohn and the Office of Development in the David L. Van Andel (Amway Corporation/Van Andel Institute) Site Visit, 02/10/05.

Participated with MDACC, Office of Development in Bert Fields Site Visit, 01/31/06.

Participated with MDACC, Office of Public Affairs, 2004 – 2005 Conquest Annual Report, 01/06/06.

Participated with MDACC, Office of Development in Reagent Brian Haley Site Visit, 07/06.

Participated with MDACC, Dr. Mendelsohn in the Annual Aspen Seminar and Hines Reception, 07/06.

Invited speaker at the V Foundation Fund Raiser, Napa Valley, CA, 08/06.

Participated with MDACC, the Anderson Foundation fund-raising meeting, 05/07.

#### **Consultantships**

N/A

#### **Military or Other Governmental Service**

N/A

#### **HONORS AND AWARDS**

International Agency for Research on Cancer (IARC), Research Fellowship, 1990

Arthritis Foundation, Research Fellowship, 1993 – 1996

The Susan Komen Foundation, Research Fellowship, 1996 – 1997

AACR-Susan G. Komen Career Development Award in Basic Cancer Research, 1999

Angel Works Award, 2000

The Gillson-Longenbaugh Foundation Awards, 2000 - 2006

The V Foundation Award on Translational Cancer Research, 2001

Randall & Dewey Award, 2002

Golfers Against Cancer Foundation Award, 2003

Recipient of the Faculty Achievement Award, 2005 – 2006

Marcus Foundation Award, 2006

Among the top 400 inventors accounting for 99% of patents filed since 1946, 2006

Recipient, Fellows of the M. D. Anderson Research Trust Award, 2006

#### **RESEARCH**

##### **Grants and Contracts (funded and pending) – past 5 years**

##### **Funded (Principal Investigator)**

Principal Investigator, NIH, R01CA78512, A receptor for tumor-homing peptides in angiogenic vasculature, 9/1/1999 – 06/30/04, \$689,207 (\$182,966/year).

Principal Investigator, NIH, 1R01CA88106, Targeted delivery of genes to angiogenic vasculature, 1/10/00 – 11/30/05, \$570,769 (\$121,001/year).

Principal Investigator, The Gillson-Longenbaugh Foundation Award, Cancer treatment by targeted drug therapy, 08/01/00 – 07/31/07, \$728,000 (\$105,000/year).

Principal Investigator, The V Foundation Award, Award Number 11-99-09932, Translation of the molecular diversity of blood vessels into vascular targeting applications, 1/1/01 – 12/31/04, \$600,000 (\$200,000/year).

Principal Investigator, NIH, P50CA90270 (PP-2), The University of Texas M. D. Anderson SPORE in prostate cancer, (Project 2 - Targeting prostate cancer bone metastasis), Program Director: Christopher Logothetis, M.D., 06/1/01 – 12/31/06, \$597,267 (\$168,635/year).

Principal Investigator, NIH, U01CA91134, Contrasting properties of integrin cytoplasmic domains, 9/4/01 – 8/31/06, \$578,120 (\$151,000/year)

Principal Investigator, U.S. Department of Defense, Innovator Award Grant: DAMD17-03-1-0384, Sub award Agreement No. R14101-7200003, Seamless integration of detection and therapy for breast cancer using targeted engineered nanoparticles, Program Director: Dr. Naomi Hallas, Rice University, 05/15/03 – 05/14/08, \$420,000 (Sub-award \$133,333/year)

Principal Investigator, U.S. Department of Defense, BC030054, Selection of therapeutic & diagnostic targets by phage display technology, center of excellence, Program Director: Saraswaiti Sukumar, Ph.D., 07/01/04 – 06/30/09, \$964,623 (Sub award \$185,431/year).

Principal Investigator, NIH, R01CA103830, Optical systems for in vivo molecular imaging of cancer, Program Director: Rebecca Richards Kortum, 08/01/04 – 07/31/09, \$2,164,607 (Sub award \$95,533/year).

Principal Investigator, NIH, P50CA100632, The University of Texas M. D. Anderson SPORE in Leukemia, (Project 7 – Identification of therapeutic targets for leukemia by phage display profiling of leukemia cell lines and patient-derived samples), Program Director: Hagop M. Kantarjian, M.D. and Jean-Pierre Issa, M.D., 08/16/04 – 04/30/08, \$170,000.

Principal Investigator, NIH, P50CA091846, Developmental research award from the developmental research. Director: Colin Dinney, M.D. The developmental research program of the genitourinary cancer SPORE, developmental research award - an artificial pore-forming protein with anti-tumor activity, 09/01/04 – 08/31/05, \$30,000.

Principal Investigator, Prostate Cancer Foundation Award, Targeting the interleukin 11R in prostate cancer metastasis, 01/01/05 – 12/31/05, \$100,000.

Principal Investigator, W8XWH-05-2-0027, U.S. Department of Defense, 04091003, IMPACT: Imaging and molecular markers for patients with lung cancer: approaches with molecular targets, complementary/innovative treatments, and therapeutic modalities, Program Director: Waun Ki Hong, M.D., 02/01/05 – 03/01/09, \$467,111 (\$110,066/year).

Principal Investigator, NIH, R01 HL081658, Regulatory roles for vascular peptidases in angiogenesis, 08/01/05 – 07/31/09, \$1,250,000 (\$250,000/year).

Principal Investigator, Marcus Foundation (Bast) (PP4): Molecular targeting using vascular zip codes, 07/10/06 – 07/09/09, \$330,264 (current year direct cost).

Principal Investigator, NCI, CA122568, Ligand-directed tumor targeting in preclinical models. 04/01/07 – 03/31/12 \$1,250,000 (250,000/year).

Principal Investigator, Prostate Cancer Foundation, Pre-clinical studies toward the translation of IL 11R targeting ligands in prostate cancer. 04/05/07-06/04/08 \$100,000

Principal Investigator, Defense Advanced Research Projects Agency (DARPA), BAA-07-21, #P-5317-MS-DRP, Defense Sciences Research and Technology, "Vascular and Lymphatic Targeting." 06/01/07-05/31/08, \$338,000 (one-year).

**Funded (Co-Principal Investigator, full signature authority)**

Co-Principal Investigator, NIH, P50CA83639, PP-DRP9, Pilot Project of The University of Texas M. D. Anderson Cancer Center SPORE in Ovarian Cancer Award, Identification of tumor markers in ovarian cancer. Director: Robert Bast, M.D, SPORE in Ovarian Cancer, 9/30/99 – 08/31/05, \$50,000.

Co-Principal Investigator, Juvenile Diabetes Foundation, 1-2001-291, Targeting angiogenic vasculature in the retina, 01/01/01 – 02/28/05, \$404,999.

Co-Principal Investigator, NIH, P50CA90270 (PP-4), University of Texas M. D. Anderson SPORE in Prostate Cancer, (Project 4 – Exploring the molecular diversity of blood vessels for diagnostic and therapeutic targeting in prostate cancer), Program Director: Christopher Logothetis, M.D., 06/01/01 – 12/31/06, \$609,379 (\$185,714/year).

Co-Principal Investigator, NIH, U54CA90810 (PP-3), Targeted assessment of antiangiogenic therapy, (Project 3: Implications of the molecular heterogeneity of tumor blood vessels), Program Director: James L. Abbruzzese, M.D., 07/16/01 – 12/31/06, \$790,197 (\$143,440/year).

Co-Principal Investigator, U.S. Department of Defense, DAMD17-02-1-0257, Probing surface heterogeneity of metastatic prostate cancer cells, 02/01/02 – 01/31/05, \$541,383.

Co-Principal Investigator, NIH, R33CA103056, Stem cell-brain tumor interplay & in vivo phage display, 08/15/03 – 07/31/08 (no cost extension), \$1,348,671 (\$444,398/year).

Co-Principal Investigator, NIH, R01DK67683, Imaging tumor blood vessels in bone metastases from breast cancer, 09/10/03 – 08/31/08 (no cost extension), \$1,159,105 (\$231,821/year).

Co-Principal Investigator, NIH, R33CA103030, Mapping vascular diversity of human cancer, 03/15/04 – 02/28/08 (no cost extension), \$843,376 (\$279,099/year).

Co-Principal Investigator, NIH, R01 DK070770, Molecular diversity in bladder cancer, 05/01/05 – 04/30/10, \$1,250,000 (\$250,000/year).

**Pending (Principal Investigator)**

Principal Investigator, R33CA122668-01, Ligand-Directed Mapping of Molecular Targets in Cancer, 07/01/2007 - 06/30/2012, \$1,250,000 (\$250,000/year)

Principal Investigator, R01CA113864-01A1, Targeted Phage-Based Vectors for Systemic Delivery of Therapeutic Agents to Brain, 12/01/2007 - 11/30/2012, \$1,250,000 (\$250,000/year)

Principal Investigator, R21CA128466-01, Gold Nanoparticle-based Scaffolds for Targeted Imaging and Tissue Ablation, 04/01/2008 - 03/31/2011, \$200,000 (\$100,000/year)

Principal Investigator, NIH, R01CA127251, The interleukin 11 receptor in angiogenesis and tissue remodeling. 04/01/2008- 03/31/2013, \$ 1,250,000 (250,000/year)

Principal Investigator, U.S. Department of Defense, Concept Award, "Molecular biopsy" for early diagnosis and disease monitoring in breast cancer patients, 07/01/07 – 06/30/08, \$75,000.



Principal Investigator, NIH, Integration of vascular genomics and proteomics for diagnosis and therapy of cancer, 02/01/08 – 01/30/13, \$1,479,193 (\$487,847/year).

Principal Investigator, NIH, Prostate Cancer SPORE, Project 2, Targeting the IL11R in Prostate Cancer Bone Metastasis, 08/08/07-09/08/13

Principal Investigator, Susan G. Komen Foundation, Imaging vascular zip codes in a model of inflammatory breast cancer. 07/03/07-04/05/10, \$350,000 over 3 years.

Principal Investigator, DOD PCRP IDEA Award, Ligand-directed and transcription profiling of prostate cancer. 07/08/08-09/08/11, \$375,000 over 3 years.

Principal Investigator, Jeffrey Rosenzweig Foundation, Integration of genomics and proteomics for imaging and therapy in pancreatic cancer. 09/01/07-08/31/09, \$50,000 (two-year).

Principal Investigator, R33 on AAVP, Integration of vascular genomics and proteomics for diagnosis and therapy of cancer. 12/01/07-11/30/10, \$1,465,324 Direct

Principal Investigator, GDD IL 11 R0-1, Targeting the interleukin-11 receptor alpha in prostate cancer metastasis, 04/01/08-3/31/13, \$1,250,000 Direct

Principal Investigator, NCI, RO1 PA-07-165, Molecular Targeting of Lymphatic Endothelial Receptors for Ligand-directed Imaging, 04/01/08-03/31/2013, \$1,250,000

Principal Investigator, NIH, PA-070-070, Targeted Modulation of Angiogenesis by VEGFR Peptidomimetic Antagonists, 04/01/2008-03/31/2013, \$785,032 Total Direct Cost

**Pending (Co-Principal Investigator)**

Co-Principal Investigator, Ligand-Directed and Transcriptional profiling in kidney cancer, 10/02/2007-03/02/12, \$1,250,000 (\$250,000/year)

**Funded Protocols**

LAB05-0154: Studies on Blood and Tumor Tissues from Patients with Lung Cancer

LAB05-0027: Laboratory Immunological Studies on Blood and Tumor Tissues from Patients with Genitourinary Cancers

LAB05-0257: Studies on Blood and Tumor Tissue from Patients with Breast Cancer

LAB05-0286: Immunological Studies on Blood and Tumor Tissues from Patients with Ovarian Cancer

LAB05-0459: Studies on Blood and Tumor Tissues from Patients with Brain Cancer

LAB04-0678: Pre-Clinical Development and Testing of New Therapeutic Agents for Chronic Lymphoid Malignancies

ACUF ID#: 11-04-10631, Targeting Therapies

ACUF ID#: 11-99-09932, Targeting Blood Vessels

ACUF ID#: 11-99-09933, Targeting Blood Vessels

**Patents Granted and Pending (U.T. M. D. Anderson Cancer Center)**

<b>Tab No.</b>	<b>F&amp;J/MDA/BS File Code</b>	<b>Filing/ Priority Date</b>	<b>Serial No.</b>	<b>Title</b>	<b>Status</b>
1	UTSC:674USP1 MDA00-025	09/08/00	60/231,266	"Compositions and Methods for Organ and Tissue Targeting in Humans"	Converted
2.	UTSC:674US MDA00-025	01/17/01 09/08/00	09/765,101		Converted to provisional application
3	UTSC:850US MDA00-025B P001	03/07/03 09/08/00	10/363,203	"Adenoviral Targeting and Manipulation of Immune System Response Using Targeting Peptides"	Pending
4	UTFC:850WO* MDA00-025B P001PCT	09/07/01 09/08/00	PCT/US/01 28045		Nationalized
5	UTFC:850AU MDA00-025B P001AU	09/07/01 09/08/00	2001/ 290663		Pending
6	UTFC:850CA MDA00-025B P001CA	09/07/01 09/08/00	2,421,200		Pending
7.	UTFC:850EP MDA00-025B P001EP	09/07/01 09/08/00	01970682.9		Pending
8.	UTFC:850JP MDA00-025B P001JP	09/07/01 09/08/00	2002/ 525731		Pending
9.	UTSC:851US MDA00-025C P002	03/07/03 09/08/00	10/363,202	"Compositions and Methods for Targeting Peptides in Humans In Vivo"	Pending
10.	UTFC:851WO* MDA00-025C P002PCT	09/07/01 09/08/00	PCT/US01/2 8044		Nationalized
11.	UTFC:851AU MDA00-025C P002AU	09/07/01 09/08/00	2001/ 290662		Pending
12.	UTFC:851CA MDA00-025C P002CA	09/07/01 09/08/00	2,421,195		Pending

\* Note that each of UTFC:850WO, UTFC:851WO, UTFC:852WO and UTFC:853WO base priority on 60/231,266, filed 9/08/00 (formerly our file ref. UTSC:674, now UTSC:850USP1)

Tab No.	F&J/MDA/BS File Code	Filing/ Priority Date	Serial No.	Title	Status
13.	UTFC:851EP MDA00-025C P002EP	09/07/01 09/08/00	01970681.1		Pending
14.	UTFC:851JP MDA00-025C P002JP	09/07/01 09/08/00	2002/ 525730		Pending
15.	UTSC:852US MDA00-025D P003	03/07/03 09/08/00	10/363,204	"Human and Mouse Targeting Peptides Identified by Phage Display"	Pending
16.	UTFC:852WO* MDA00-025D P003PCT	09/07/01 09/08/00	PCT/US01/2 7692		Nationalized
17.	UTFC:852AU MDA00-025D P003AU	09/07/01 09/08/00	2001/ 288843		Pending
18.	UTFC:852CA MDA00-025D P003CA	09/07/01 09/08/00	2,421,271		Pending
19.	UTFC:852EP MDA00-025D P003EP	09/07/01 09/08/00	01968603.9		Pending
20.	UTFC:852JP MDA00-025D P003JP	09/07/01 09/08/00	2002/ 525776		Pending
21.	UTSC:853US MDA00-025E P004	03/07/03 09/08/00	10/363,205	"Biopanning and Rapid Analysis of Selective Interactive Ligands"	Pending
22.	UTFC:853WO* MDA00-025E P004PCT	09/07/01 09/08/00	PCT/US01/2 8124		Nationalized
23.	UTFC:853AU MDA00-025E P004AU	09/07/01 09/08/00	2001/ 288914		Pending
24.	UTFC:853CA MDA00-025E P004CA	09/07/01 09/08/00	2,421,380		Pending

Tab No.	F&J/MDA/BS File Code	Filing/ Priority Date	Serial No.	Title	Status
25.	UTFC:853EP MDA00-025E P004EP	09/07/01 09/08/00	01968683.1		Pending
26.	UTFC:853JP MDA00-025E P004JP	09/07/01 09/08/00	2002/ 525828		Pending
27.	UTFC:854WO MDA00-025F P005PCT	09/07/01 09/08/00	PCT/US01/2 7702		Nationalized
28.	UTSC:854US MDA00-025F P005	09/02/03 09/08/00	10/363,208	"Methods and Compositions for In Vitro Targeting"	Pending
29.	UTFC:854AU MDA00-025F P005AU	09/07/01 09/08/00	2001/ 290,652		Pending
30.	UTFC:854CA MDA00-025F P005CA	09/07/01 09/08/00	2,421,191		Pending
31.	UTFC:854EP MDA00-025F P005EP	09/07/01 09/08/00	01970671.2		Pending
32.	UTFC:854JP MDA00-025F P005JP	09/07/01 09/08/00	2002/ 525729		Pending
33.	UTSC:855USP1 MDA01-093 P008Z	07/18/01	60/306,506	"Anti-Angiogenic State in Mice and Humans with Retinal Photoreceptor Cell Degeneration"	Expired
34.	UTFC:855WO MDA01-093 P008PCT	07/17/02 07/18/01	PCT/US02/2 2971		Nationalized
35.	UTSC:855US MDA01-093 NA	01/20/04 07/18/01	10/484,550		Pending
36.	UTFC:855EP MDA01-093	07/17/02 07/18/01	02761131.8		Pending

Tab No.	F&J/MDA/BS File Code	Filing/ Priority Date	Serial No.	Title	Status
37.	UTFC:855CA MDA01-093	07/17/02 07/18/01	2,454,357		Pending
38.	UTFC:856WO MDA00-025CIP1 P009PCT	08/30/02 09/07/01	PCT/US02/2 7836	"Compositions and Methods of Use of Targeting Peptides Against Placenta and Adipose Tissues"	Nationalized
39.	UTSC:856US MDA00-025CIP1	03/08/04 09/07/01	10/489,071		Pending
40.	UTSC:856EP MDA00-025CIP1	04/06/04 09/07/01	Not received yet		Pending
41.	UTFC:856CA MDA00-025CIP1	08/30/02 09/07/01	Not received yet		Pending
42.	UTFC:857WO MDA04-113 P010PCT	10/30/02 08/30/02	PCT/US02/3 4987	"Compositions and Methods of Use of Targeting Peptides for Diagnosis and Therapy of Human Cancer"	Pending
43.	UTSC:858USP1 MDA03-071P1 P011Z	04/14/03	60/462,631	"Methods for Hybridoma-Free Production of Murine and Human Monoclonal Antibodies"	Pending
44.	UTSC:860USP1 MDA03-071P2 P013Z	11/24/03	60/524,701	"Methods for Ex Vivo Hybridoma-Free Production of Murine and Human Polyclonal and Monoclonal Antibodies and Generation of Immortalized Cell Populations"	Pending

Tab No.	F&J/MDA/BS File Code	Filing/ Priority Date	Serial No.	Title	Status
45.	UTSC:858US MDA03-071	04/14/04 04/14/03 & 11/24/03	10/824,627	"Methods for Ex Vivo Hybridoma-Free Production of Polyclonal and Monoclonal Antibodies and Generation of Immortalized Cell Populations"	Pending
46.	UTFC:858WO MDA03-071	04/14/04 04/14/03	PCT/US04/1 1427		Pending
47.	UTSC:859USP1 MDA03-125 P012Z	09/12/03	60/502,509	"Biopanning as an Approach to Study the Pathogenesis of an Invent Novel Treatment Modalities for Invasive Aspergillosis"	Pending
48.	UTSC:861USP1 MDA04-030 P014Z	12/31/03	60/533,650	"Compositions and Methods of Use of Targeting Peptides for Diagnosis and Therapy" (IL-11 Receptor Targeting)	Pending
49.	UTSC:872US MDA00-025CIP2	02/23/04 09/08/00	10/784,537	"Aminopeptidase A (APA) Targeting Peptides for the Treatment of Cancer"	Pending
50.	UTSC:890USP1 MDA04-089	07/10/04	60/586,814	"Composition and Methods Related to Peptides that Selectively Bind Leukemic Cells."	Provisional application filed
51.	UTSC:889 MDA04-083	11/16/2004	60/628,472	"Methods and Compositions Related to Phage Nanoparticles"	Provisional application filed
52.	UTXC:891 MDA04-093	11/16/2004	60/628,495	"Synchronous Selection of Homing Peptides for Multiple Tissues by in Vivo Phage Display"	Provisional application filed
53.	UTSC:916USP1	03/09/06		"Compositions and Methods Related to Profiling A Plurality of Cell Lines Based on Peptide Binding"	Provisional application filed
54.		04/01/06		"Targeted Manipulation of Gene Expression"	Provisional application filed

# **Patents Granted and Pending (The Burnham Institute)**

Family	#	Patent/Patent Application No.	C&F Docket#	Patent Type
1	Method of Identifying molecules that home to a selected organ in vivo			
	1	5622699	P-LJ 1779	Parent
	2	08/813,273	P-LJ 2410	CIP of 08/526,710
	3	6068829	P-LJ 2621	CIP of 08/526,710
	4	09/226,985	P-LJ 3423	Cont. of 08/526,710
	5	09/227,906	P-LJ 3424	Cont. of 08/526,710
	6	96250195.3	FP-LJ 2173	Foreign
	7	96930824.6	FP-LJ 3014	Foreign
	8	US96/14600	FP-LJ 2174	Foreign
	9	2204535	FP-LJ 2533	Foreign
	10	9-512087	FP-LJ 2534	Foreign
	11	63740/98	FP-LJ 3062	Foreign
	12	99250432.4	FP-LJ 3859	Foreign
2	Molecules that home to a selected organ in vivo			
	13	09/228,866	P-LJ 3430	Cont. of 08/526,708
3	Molecules that home to various selected organs or tissues			
	14	09/042,107	P-LJ 2892	Parent
	15	09/722,250	P-LJ 4514	Cont. of 09/042,107
4	Tumor homing molecules, conjugates derived therefrom, and methods of using same			
	16	08/926,914	P-LJ 2725	Substitute of 08/710,067
	17	97942422.3	FP-LJ 3466	Foreign
	18	US97/16086	FP-LJ 2803	Foreign
	19	44122/97	FP-LJ 3463	Foreign
	20	2,265,484	FP-LJ 3464	Foreign
	21	10-513856	FP-LJ 3465	Foreign
5	NGR receptor and methods of identifying tumor homing molecules that home to angiogenic vasculature using same			
	22	09/139,802	P-LJ 3203	CIP of 08/926,914
		09/659,786	P-LJ 4296	Cont. of 09/139,802
	23	US98/18895	FP-LJ 3296	Foreign
	24	98948140.3	FP-LJ 4024	Foreign
	25	2000-511062	FP-LJ 4025	Foreign
6	Methods of identifying lung homing molecules using membrane dipeptidase			
	26	09/258,754	P-LJ 3443	CIP of 09/042,107
	27	US99/05284	FP-LJ 3406	PCT
7	NG2 proteoglycan-binding peptides home to tumor vasculature			
	28	09/250,700	P-LJ 3433	Parent
	29	US00/01602	FP-LJ 3866	PCT
8	Homing pro-apoptotic conjugates and methods of using same			

Family	#	Patent/Patent Application No.	C&F Docket#	Patent Type
9	38	09/235,902	P-LJ 3371	Parent
	39	US00/01602	FP-LJ 3866	PCT
		Chimeric prostate-homing peptides with-proapoptotic activity		
	40	09/489,582	P-LJ 3844	Parent
	41	09/765,086	P-LJ 4575	
10	42	Methods of targeting angiogenic vasculature using gelatinase inhibitors		
		09/552,805	P-LJ 3802	

**Grant Reviewer/Service on NIH/Other Study Sections**

NIH Study Section, RFA, Gene Transfer Principles for Heart, Lung, and Blood Disorders, 1997

Department of Defense Study Section, Prostate Cancer Research Program, 1998, 1999

NIH Study Section, NCI, SBIR/STTR Program, 1999

NIH Study Section, NCI, Developmental Therapeutics Program, RAID, 1999

NIH Study Section, NCI, Angiogenesis PAR, 1999

NIH Study Section, NCI, Molecular Target Drug Discovery RFA, 2000

Dutch Cancer Society, 2000 - Present

Italian Cancer Research Foundation, 2001 - Present

The WELLCOME Trust, London UK, 2001 - Present

NIH Study Section, NCI, P0-1 Site Visit Panel, Harvard Medical School, 2001

Department of Energy, Targeted Therapeutics Research Program, 2001

NIH Study Section, NCI, Molecular Target Drug Discovery RFA, 2001

NIH Study Section, NIDDK, P0-1 Site Visit Panel, UT Southwestern, 2001

NCI, Parent Committee C, 2002

NCI, P0-1 Site Visit Panel, Scripps Research Institute, CA, 2002

AACR Special Meetings Committee, 2002

NCI, P0-1 Site Visit Panel, Ralph H. Johnson VA Hospital, South Carolina, 2002

NCI, Path A Study Section, 2002

The Canadian Institutes of Health Research, CIHR, 2002

Extramural Advisory Board, Vascular Biology Faculty of the Center for Cancer Research, NCI, 2002



Italian Ministry of Education, 2002 - Present

NIDA, CEBRA Stage I Review, 2002

Trainee Recognition Day, 2003

U.S. Department of Defense, BCRP Programmatic Review Meeting, Committee, 2003-2004

NCI, Intramural Review Panel, 2003

NCI, Genitourinary Cancer SPORE Review, 2003

NCI, P0-1 site visit, Ralph H. Johnson VA Hospital, South Carolina, 2003

National Cancer Institute Mouse Cancer Genetics Program Site Visit, Frederick, Maryland, 2003

AACR Grants Committee (Gertrude Elion Award, Career Development Awards, Research Fellowship Awards), 2004

NIH Road Map Initiative, R0-3 Study Section, 2004

Singapore Cancer Research Foundation, 2004

NCI, Head & Neck SPORE Review, 2004

NIH, Special Emphasis Panel (SEP): High Throughput Molecular Screening Assay Development", 2004.

U.S. Department of Defense, Breast Cancer Research Program (BCRP) Programmatic Review, 2004.

NCI, Vascular Biology Study Section, 2004-Present

NCI, SBIR Study Section, 2005

NCI, LRP Study Section, 2005

The Israel Science Foundation, Israel Academy of Sciences and Humanities, 2005

NCI, Centers of Cancer Nanotechnology Excellence, 2005

Special Emphasis Panel for the Review of Applications Submitted in Response to RFA-05-024, entitled "Centers of Cancer Nanotechnology Excellence" (CCNEs), 2005

Special Emphasis Panel, In Vivo Cellular and Molecular Imaging Centers (ICMICS), 2005

MRC Molecular and Cellular Medicine Board, UK, 2005

American Heart Association, Western Review Consortium, 2006

Nanotechnology Panel, Association of Health Care Journalists Conference, 2006

The BSF (United States-Israel Binational Science Foundation), 2006

LRP Review, 2006

Special Emphasis Panel/Scientific Review Group 2007/01 ZRG1 BST-R (50) R Meeting, 2006

Ad Hoc Member, Breast Cancer SPORE, Pilot Projects Review Panel. Principal Investigator: Dr. Carlos Arteaga, Vanderbilt University School of Medicine, 2006

Ad Hoc Member, NIH Study Section, Bioengineering Research Partnership: Bioengineering Sciences and Technologies IRG (BST), 2006

Member, Scientific Program Committee Subgroup of Society for Molecular Imaging, 2007

Ad Hoc Member, Gene and Drug Delivery Study Section, NIH/NCI, 2007

Member, Israel Science Foundation, 2007

Member, IMPACT BCRP, DOD, 2007

Member, Cancer Research UK, 2007

Abstract Reviewer, International Society for Biological Therapy of Cancer 22<sup>nd</sup> Annual Meeting, 2007

## PUBLICATIONS

### a. Articles in Peer-Reviewed Journals

1. Brentani RR, Ribeiro SF, Potocnjak P, **Pasqualini R**, Lopes JD, Nakaie CR. Characterization of the cellular receptor for fibronectin through a hydrophobic complementarity approach. *Proc Natl Acad Sci U S A* 85:364-7, 1988.
2. **Pasqualini R**, Chamone DF, Brentani RR. Determination of the putative binding site for fibronectin on platelet glycoprotein IIb-IIIa complex through a hydrophobic complementarity approach. *J Biol Chem* 264:14566-70, 1989.
3. De Souza SJ, Sabbaga J, D'Amico E, **Pasqualini R**, Brentani R. Anti-platelet autoantibodies from ITP patients recognize an epitope in GPIIb/IIIa deduced by complementary hydrophobicity. *Immunology* 75:17-22, 1992.
4. Oettinger HF, **Pasqualini R**, Bernfield M. Recombinant peptides as immunogens: a comparison of protocols for antisera production using the pGEX system. *Biotechniques* 12:544-9, 1992.
5. **Pasqualini R**, Levi JE, Azul MI, Faria M, de Souza SJ, Brentani R. A monoclonal antibody (IID510g52) for the determination of functional domains within integrin cell surface receptors. *Hybridoma* 11:741-55, 1992.
6. Manjunath N, Johnson RS, Staunton DE, **Pasqualini R**, Ardman B. Targeted disruption of CD43 gene enhances T lymphocyte adhesion. *J Immunol* 151:1528-34, 1993.
7. **Pasqualini R**, Bodorova J, Ye S, Hemler ME. A study of the structure, function and distribution of beta 5 integrins using novel anti-beta 5 monoclonal antibodies. *J Cell Sci* 105:101-11, 1993.
8. Weitzman JB, **Pasqualini R**, Takada Y, Hemler ME. The function and distinctive regulation of the integrin VLA-3 in cell adhesion, spreading, and homotypic cell aggregation. *J Biol Chem* 268:8651-7, 1993.
9. Bergelson JM, St. John NF, Kawaguchi S, **Pasqualini R**, Berdichevsky F, Hemler ME, Finberg RW. The I domain is essential for echovirus 1 interaction with VLA-2. *Cell Adhes Commun* 2:455-64, 1994.

10. **Pasqualini R**, Hemler ME. Contrasting roles for integrin beta 1 and beta 5 cytoplasmic domains in subcellular localization, cell proliferation, and cell migration. *J Cell Biol* 125:447-60, 1994.
11. **Pasqualini R**, Koivunen E, Ruoslahti E. A peptide isolated from phage display libraries is a structural and functional mimic of an RGD-binding site on integrins. *J Cell Biol* 130:1189-96, 1995.
12. **Pasqualini R**, Koivunen E, Ruoslahti E. Peptides in cell adhesion: powerful tools for the study of integrin-ligand interactions. *Brazilian Journal of Medical & Biological Research* 29:1151-8, 1996.
13. **Pasqualini R**, Bourdoulous S, Koivunen E, Woods VL Jr, Ruoslahti E. A polymeric form of fibronectin has antimetastatic effects against multiple tumor types. *Nat Med* 2:1197-1203, 1996.
14. **Pasqualini R**, Ruoslahti E. Organ targeting in vivo using phage display peptide libraries. *Nature* 380:364-6, 1996.
15. **Pasqualini R**, Koivunen E, Ruoslahti E. Alpha v integrins as receptors for tumor targeting by circulating ligands. *Nature Biotechnol* 15:542-6, 1997.
16. Arap W, **Pasqualini R**, Ruoslahti E. Cancer treatment by targeted drug delivery to tumor vasculature in a mouse model. *Science* 279:377-80, 1998.
17. Bourdoulous S, Orend G, MacKenna DA, **Pasqualini R**, Ruoslahti E. Fibronectin matrix regulates activation of RHO and CDC42 GTPases and cell cycle progression. *J Cell Biol* 143:267-76, 1998.
18. Rajotte D, Arap W, Hagedorn M, Koivunen E, **Pasqualini R**, Ruoslahti E. Molecular heterogeneity of the vascular endothelium revealed by in vivo phage display. *J Clin Invest* 102:430-7, 1998.
19. Burg MA, **Pasqualini R**, Arap W, Ruoslahti E, Stallcup WB. NG2 proteoglycan-binding peptides target tumor neovasculature. *Cancer Res* 59:2869-74, 1999.
20. Ellerby HM, Arap W, Ellerby LM, Kain R, Andrusiak R, Rio GD, Krajewski S, Lombardo CR, Rao R, Ruoslahti E, Bredesen DE, **Pasqualini R**. Anti-cancer activity of targeted pro-apoptotic peptides. *Nat Med* 5:1032-8, 1999.
21. Koivunen E, Arap W, Valtanen H, Rainisalo A, Medina OP, Heikkila P, Kantor C, Gahmberg CG, Salo T, Kontinen YT, Sorsa T, Ruoslahti E, **Pasqualini R**. Tumor targeting with a selective gelatinase inhibitor. *Nat Biotechnol* 17:768-74, 1999.
22. **Pasqualini R**, Koivunen E, Kain R, Lahdenranta J, Sakamoto M, Stryhn A, Ashmun RA, Shapiro LH, Arap W, Ruoslahti E. Aminopeptidase N is a receptor for tumor-homing peptides and a target for inhibiting angiogenesis. *Cancer Res* 60:722-7, 2000.
23. Tellier MC, Greco G, Klotman M, Mosoian A, Cara A, Arap W, Ruoslahti E, **Pasqualini R**, Schnapp LM. Superfibronectin, a multimeric form of fibronectin, increases HIV infection of primary CD4+ T lymphocytes. *J Immunol* 164:3236-45, 2000.
24. Fukuda MN, Ohyama C, Lowitz K, Matsuo O, **Pasqualini R**, Ruoslahti E, Fukuda M. A peptide mimic of E-selectin ligand inhibits sialyl Lewis X-dependent lung colonization of tumor cells. *Cancer Res* 60:450-6, 2000.
25. Ogawa K, **Pasqualini R**, Lindberg RA, Kain R, Freeman AL, Pasquale EB. The ephrin-A1 ligand and its receptor, EphA2, are expressed during tumor neovascularization. *Oncogene* 19:6043-52, 2000.

26. Trepel M, Grifman M, Weitzman MD, **Pasqualini R**. Molecular adaptors for vascular-targeted adenoviral gene delivery. *Hum Gene Ther* 11:1971-81, 2000.
27. Bhagwat SV, Lahdenranta J, Giordano R, Arap W, **Pasqualini R**, Shapiro, LH. CD13/APN is activated by angiogenic signals and is essential for capillary tube formation. *Blood* 97:652-9, 2001.
28. Gerlag DM, Borges E, Tak PP, Ellerby HM, Bredesen DE, **Pasqualini R**, Ruoslahti E, Firestein GS. Suppression of murine collagen-induced arthritis by targeted apoptosis of synovial neovasculation. *Arthritis Res* 3:357-61, 2001.
29. Giordano RJ, Cardó-Vila M, Lahdenranta J, **Pasqualini R**, Arap W. Biopanning and rapid analysis of selective interactive ligands. *Nat Med* 7:1249-53, 2001.
30. Grifman M, Trepel M, Speece P, Gilbert LB, Arap W, **Pasqualini R**, Weitzman MD. Incorporation of tumor-targeting peptides into recombinant adeno-associated virus capsids. *Mol Ther* 3:964-75, 2001.
31. Lahdenranta J, **Pasqualini R**, Schlingemann RO, Hagedorn M, Stallcup WB, Bucana CD, Sidman RL, Arap W. An anti-angiogenic state in mice and humans with retinal photoreceptor cell degeneration. *Proc Natl Acad Sci U S A* 98:10368-73, 2001.
32. Trepel M, Arap W, **Pasqualini R**. Modulation of the immune response by systematic targeting of antigens to lymph nodes. *Cancer Res* 61:8110-12, 2001.
33. Hoffman M, Olson, K, Cavender A, **Pasqualini R**, Gaikwad J, D'Souza RN. Gene expression in a pure population of odontoblasts isolated by laser-capture microdissection. *J Dent Res* 80:1963-67, 2001.
34. Arap W, Haedicke W, Bernasconi M, Kain R, Rajotte D, Krajewski S, Ellerby HM, Bredesen DE, **Pasqualini R**, Ruoslahti E. Targeting the prostate for destruction through a vascular address. *Proc Natl Acad Sci U S A* 99:1527-31, 2002.
35. Arap W, Kolonin MG, Trepel M, Lahdenranta J, Cardó-Vila M, Giordano RJ, Mintz PJ, Ardelt PU, Yao VJ, Vidal CI, Chen L, Flamm A, Valtanen H, Weavind LM, Hicks ME, Pollock RE, Botz GH, Bucana CD, Koivunen E, Cahill D, Troncoso P, Baggerly KA, Pentz RD, Do KA, Logothetis CJ, **Pasqualini R**. Steps toward mapping the human vasculature by phage display. *Nat Med* 8:121-7, 2002.
36. Curnis F, Arrigoni G, Sacchi A, Fischetti L, Arap W, **Pasqualini R**, Corti A. Differential binding of drugs containing the NGR motif to CD13 isoforms in tumor vessels, epithelia, and myeloid cells. *Cancer Res* 62:867-74, 2002.
37. Greco G, Pal S, **Pasqualini R**, Schnapp LM. Matrix fibronectin increases HIV stability and infectivity. *J Immunol* 168:5722-29, 2002.
38. Kolonin MG, **Pasqualini R**, Arap W. Teratogenicity induced by targeting a placental immunoglobulins transporter. *Proc Natl Acad Sci U S A* 99:13055-60, 2002.
39. Ardelt PU, Wood CG, Chen L, Mintz PJ, Moya C, Arap MA, Wright KC, **Pasqualini R**, Arap W. Targeting urothelium: Ex-vivo assay standardization and selection of internalizing ligands. *J Urol* 169:1535-40, 2003.
40. Cardó-Vila M, Arap W, **Pasqualini R**.  $\alpha\beta 5$  Integrin-dependent programmed cell death triggered by a peptide mimic of annexin V. *Mol Cell* 11:1151-62, 2003.

41. Ellerby HM, Lee S, Ellerby LM, Chen S, Kiyota T, del Rio G, Sugihara G, Sun Y, Bredesen DE, Arap W, **Pasqualini R**. An artificially designed pore-forming protein with anti-tumor effects. *J Biol Chem* 278:35311-16, 2003.
42. Mintz P, Kim J, Do KA, Wang X, Zinner RG, Cristofanilli M, Arap MA, Hong WK, Troncoso P, Logothetis CJ, **Pasqualini R**, Arap W. Fingerprinting the circulating repertoire of antibodies from cancer patients. *Nat Biotechnol* 21:57-63, 2003.
43. Müller OJ, Kaul F, Weitzman MD, **Pasqualini R**, Arap W, Kleinschmidt JA, Trepel M. Random peptide libraries displayed on adeno-associated virus to select for targeted gene therapy vectors. *Nat Biotechnol* 21:1040-46, 2003.
44. Pentz RD, Flamm AL, **Pasqualini R**, Logothetis CJ, Arap W. Revisiting ethical guidelines for research with terminal wean and brain-dead participants. *Hastings Cent Rep* 33:20-6, 2003.
45. Tamm I, Trepel M, Cardó-Vila M, Sun Y, Welsh K, Cabezas E, Swatterthwait A, Arap W, Reed JC, **Pasqualini R**. Peptides targeting caspase inhibitors. *J Biol Chem* 278:14401-05, 2003.
46. Arap MA, Lahdenranta J, Mintz PJ, Hajitou A, Sarkis AS, Arap W, **Pasqualini R**. Cell surface expression of the stress response chaperone GRP78 enables tumor targeting by circulating ligands. *Cancer Cell* 6:275-84, 2004.
47. Arap MA, Lahdenranta J, Hajitou A, Marini FC III, Wood CG, Wright KC, Fueyo J, Arap W, **Pasqualini R**. Model of unidirectional transluminal gene transfer. *Mol Ther* 9:305-10, 2004.
48. Chen L, Zurita AJ, Ardelt PU, Giordano RJ, Arap W, **Pasqualini R**. Design and validation of a bifunctional ligand display system for receptor targeting. *Chem Biol* 11:1081-91, 2004.
49. Kolonin MG, Saha PK, Chan L, **Pasqualini R**, Arap W. Reversal of obesity by targeted ablation of adipose tissue. *Nat Med* 10:625-32, 2004.
50. Marchió S, Lahdenranta J, Schlingemann RO, Valdembri D, Wesseling P, Arap MA, Hajitou A, Ozawa MG, Trepel M, Giordano RJ, Nanus DM, Dijkman HBPM, Oosterwijk E, Sidman RL, Cooper MD, Bussolino F, **Pasqualini R**, Arap W. Aminopeptidase A is a functional target in angiogenic blood vessels. *Cancer Cell* 5:151-62, 2004.
51. **Pasqualini R**, Arap W. Hybridoma-free generation of monoclonal antibodies. *Proc Natl Acad Sci U S A* 101:257-9, 2004.
52. Vidal CI, Mintz PJ, Lu K, Ellis LM, Manenti L, Giavazzi R, Gershenson DM, Broaddus R, Liu J, Arap W, **Pasqualini R**. An HSP90-mimic peptide revealed by fingerprinting the pool of antibodies from ovarian cancer patients. *Oncogene* 23:8859-67, 2004.
53. Zurita AJ, Troncoso P, Cardó-Vila M, Logothetis CJ, **Pasqualini R**, Arap W. Combinatorial screenings in patients: The interleukin-11 receptor  $\alpha$  as a candidate target in the progression of human prostate cancer. *Cancer Res* 64:435-9, 2004.
54. Marchió S, Alfano M, Primo L, Gramaglia D, Butini L, Gennero L, De Vivo E, Arap W, Giacca M, **Pasqualini R**, Bussolino F. Cell surface-associated tat modulates HIV-1 infection and spreading through a specific interaction with gp120 viral envelope protein. *Blood* 105:2802-11, 2005.
55. Yao VJ, Ozawa MG, Trepel M, Arap W, McDonald DM, **Pasqualini R**. Targeting pancreatic islets with phage display assisted by laser pressure catapult microdissection. *Am J Path* 166:625-36, 2005.

56. Giordano RJ, Anobom CD, Cardó-Vila M, Kalil J, Valente AP, **Pasqualini R**, Almeida FCL, Arap W. Structural basis for the interaction of a vascular endothelial growth factor mimic peptide motif and its corresponding receptors. *Chem Biol* 12:1075-83, 2005.
57. Ozawa MG, Yao VJ, Chanthery YH, Troncoso P, Uemura A, Varner AS, Kasman IM, **Pasqualini R**, Arap W, McDonald DM. Angiogenesis with pericyte abnormalities in a transgenic model of prostate cancer. *Cancer* 104:2104-15, 2005.
58. Lionakis MS, Lahdenranta J, Sun J, Liu W, Lewis RE, Albert ND, **Pasqualini R**, Arap W, Kontoyiannis DP. Development of a ligand-directed approach to study the pathogenesis of invasive aspergillosis. *Infect Immun* 73:7747-58, 2005.
59. Oh Y, Mohiuddin I, Sun Y, Putman JB, Jr, Hong WK, Arap W, **Pasqualini R**. Phenotypic diversity of the lung vasculature in experimental models of metastases. *Chest* 128(Suppl 6):596S-600S, 2005.
60. Barker TH, Baneyx G, Cardó-Vila M, Workman GA, Weaver M, Menon PM, Dedhar S, Rempel SA, Arap W, **Pasqualini R**, Vogel V, Sage EH. SPARC regulates extracellular matrix organization through its modulation of integrin-linked kinase activity. *J Biol Chem* 280:36483-93, 2005.
61. Yao VJ, Ozawa MG, Varner AS, Kasman IM, Chanthery Y, **Pasqualini R**, Arap W, McDonald DM. Anti-angiogenic therapy decreases integrin expression in normalized tumor blood vessels. *Cancer Res* 66:2639-49, 2006.
62. Souza GR, Christianson DR, Staquicini FI, Ozawa MG, Snyder EY, Sidman RL, Miller JH, Arap W, **Pasqualini R**. Networks of gold nanoparticles and bacteriophage as biological sensors and cell-targeting agents. *Proc Natl Acad Sci U S A* 103:1215-20, 2006.
63. Kolonin MG, Bover L, Sun J, Zurita AJ, Do KA, Lahdenranta J, Cardó-Vila M, Giordano RJ, Jaalouk DE, Ozawa MG, Moya CA, Souza GR, Staquicini FI, Kunyiasu A, Scudiero DA, Holbeck SL, Sausville EA, Arap W, **Pasqualini R**. Ligand-directed surface profiling of human cancer cells with combinatorial peptide libraries. *Cancer Res* 66:34-40, 2006.
64. Hajitou A, Trepel M, Lilley CE, Soghomonyan S, Alauddin MM, Marini FC III, Restel BH, Ozawa MG, Moya CA, Rangel R, Sun Y, Zaoui K, Schmidt M, von Kalle C, Weitzman MD, Gelovani JG, **Pasqualini R**, Arap W. A hybrid vector for ligand-directed tumor targeting and molecular imaging. *Cell* 125:385-98, 2006.
65. Kolonin MG, Sun J, Do KA, Vidal CI, Ji Y, Baggerly KA, **Pasqualini R**, Arap W. Synchronous selection of homing peptides for multiple tissues by in vivo phage display. *FASEB J* 20:979-81, 2006.
66. Souza GR, Levin CS, Hajitou A, **Pasqualini R**, Arap W, Miller JH. In vivo detection of gold-imidazole self-assembly complexes: NIR-SERS signal reporters. *Anal Chem* 78:6232-37, 2006.
67. Tudor RM, Yoshida T, Arap W, **Pasqualini R**, Petrache I. State of the art. Cellular and molecular mechanisms of alveolar destruction in emphysema: An evolutionary perspective. *Proc Am Thorac Soc* 3:503-10, 2006.
68. Kzhyshkowska J, Workman G, Cardó-Vila M, Arap W, **Pasqualini R**, Gratchev A, Krusell L, Goerdts S, Sage EH. Novel function of alternatively activated macrophages: stabilin-1 mediated clearance of SPARC. *J Immunol* 176:5825-32, 2006.

69. Hajitou A, Rangel R, Trepel M, Sghomonyan S, Gelovani JG, Alauddin MM, **Pasqualini R**, Arap W. Design and construction of targeted AAVP vectors for mammalian cell transduction. *Nat Protoc* 3:523-31, 2007.
70. Rangel R, Sun Y, Guzman-Rojas L, Ozawa MG, Sun J, Giordano RJ, Van Pelt CS, Tinkey PT, Behringer RR, Sidman RL, Arap W, **Pasqualini R**. Impaired angiogenesis in aminopeptidase N-null mice. *Proc Natl Acad Sci U S A* 104:4588-93, 2007.
71. Ji Y, Yin GS, Tsui KW, Kolonin MG, Sun J, Arap W, **Pasqualini R**, Do KA. Bayesian mixture models for complex high dimensional count data in phage display experiments. *Appl Statist* 56:1-14, 2007.
72. Sghomonyan S, Hajitou A, Rangel R, **Pasqualini R**, Arap W, Gelovani JG, Alauddin M. Molecular PET imaging of HSV1-tk reporter gene expression using <sup>18</sup>F-FEAU. *Nat Protoc* 2:416-23, 2007.
73. Lahdenranta J, Sidman RL, **Pasqualini R**, Arap W. Treatment of hypoxia-induced retinopathy with targeted proapoptotic peptidomimetic in a mouse model of disease. *FASEB J*, Epub ahead of print, 05/18/07.
74. Bover LC, Cardó-Vila M, Sun J, Aggarwal B, Arap W, **Pasqualini R**. A previously unrecognized protein-protein interaction between TWEAK and CD163: potential biological implications. *J Immunol* 178:8183-94, 2007.
75. Jaalouk DE, Schlingemann RO, Ozawa MG, Sun J, Lahdenranta J, **Pasqualini R**, Arap W. The original PAL-E monoclonal antibody recognizes a VEGF-binding site within neuropilin-1. *Cancer Res* (In press).

**b. Invited Articles**

1. **Pasqualini R**, Ruoslahti E. Searching for a molecular address in the brain. *Mol Psychiatry* 1:421-2, 1996.
2. **Pasqualini R**, Ruoslahti E. Tissue targeting with phage peptide libraries. *Mol Psychiatry* 1:423, 1996.
3. Arap W, **Pasqualini R**, Ruoslahti E. Chemotherapy targeted to tumor vasculature. *Curr Opin Oncol* 10:560-5, 1998.
4. Koivunen E, Arap W, Rajotte D, Lahdenranta J, **Pasqualini R**. Identification of receptor ligands with phage display peptide libraries. *J Nucl Med* 40:883-8, 1999.
5. **Pasqualini R**. Vascular targeting with phage peptide libraries. *Q J Nucl Med* 43:159-62, 1999.
6. Arap W, **Pasqualini R**. The human vascular mapping project. Selection and utilization of molecules for tumor endothelial targeting. *Haemostasis* 1(Suppl 31): 30-31, 2001.
7. Kolonin M, **Pasqualini R**, Arap W. Molecular addresses in blood vessels as targets for therapy. *Curr Opin Chem Biol* 5:308-13, 2001.
8. **Pasqualini R**, Arap W, McDonald DM. Probing the structural and molecular diversity of tumor vasculature. *Trends Mol Med* 8:563-71, 2002.
9. Trepel M, Arap W, **Pasqualini R**. In vivo phage display and vascular heterogeneity: implications for targeted medicine. *Curr Opin Chem Biol* 6:399-404, 2002.
10. **Pasqualini R**, Arap W. Translation of vascular diversity into targeted therapeutics. *Ann Hematol*

81(Suppl 2):S66-7, 2002.

11. Arap W, **Pasqualini R**. In vivo screening: Vascular Maps. *Nature Reviews Drug Discovery* 1:174, 2002.
12. **Pasqualini R**, Barbas CF 3rd, Arap W. Putting a Finger on Angiogenesis. *Nat Med* 2002.
13. Sokolov K, Aaron J, Hsu B, Nida D, Gillenwater A, Follen M, MacAulay C, Adler-Storthz K, Korgel B, Descour M, **Pasqualini R**, Arap W, Lam W, Richards-Kortum R. Optical systems for in vivo molecular imaging of cancer. *Technol Cancer Res Treat* 2:491-504, 2003.
14. Zurita AJ, Arap W, **Pasqualini R**. Mapping tumor vascular diversity by screening phage display libraries. *J Control Release* 91:183-6, 2003.
15. Hajitou A, **Pasqualini R**, Arap W. Vascular targeting: Recent advances and therapeutic perspectives. *Trends Cardiovasc Med* 16:80-8, 2006.
16. Sergeeva A, Kolonin MG, Molldrem JJ, **Pasqualini R**, Arap W. Display technologies: application for the discovery of drug and gene delivery agents. *Adv Drug Deliv Rev* 58:1622-54, 2006.
17. Sato M, **Pasqualini R**, Arap W. Molecular Targets on Blood Vessels for Cancer Therapies Currently in Clinical Trials. *Oncology* (In press).
18. **Pasqualini R**, Arap W. Therapeutic applications of vascular proteomics. *Nat Rev Drug Disc* (In press).

**c. Editorials & Letters**

1. Trepel M, Arap W, **Pasqualini R**. Exploring vascular heterogeneity for gene therapy targeting. *Gene Ther* 7:2059-60, 2000.
2. Cardó-Vila M, Arden KC, Cavenee WK, **Pasqualini R**, Arap W. Is annexin 7 a tumor suppressor gene in prostate cancer? *Pharmacogenomics J* 1:92-4, 2001.
3. **Pasqualini R**, McDonald DM, Arap W. Vascular targeting and antigen presentation. *Nat Immunol* 2:567-8, 2001.
4. **Pasqualini R**, Barbas CF III, Arap W. Vessel maneuvers: zinc fingers promote angiogenesis. *Nat Med* 8:1353-4, 2002.
5. Kontoyiannis DP, **Pasqualini R**, Arap W. Aminopeptidase N inhibitors and SARS. *Lancet* 361:1558, 2003.
6. Arap W, **Pasqualini R**. Engineered embryonic endothelial progenitor cells as therapeutic Trojan horses. *Cancer Cell* 5:406-8, 2004.

**d. Other Articles**

N/A

**e. Abstracts (since relocation to The University of Texas M. D. Anderson Cancer Center)**

1. Arap W, **Pasqualini R**. The human vascular mapping project. CaP CURE 8th Annual Scientific Retreat, Lake Tahoe, NV, September 6-9, 2001.
2. Giordano R, Cardó-Vila M, Lahdenranta J, **Pasqualini R**, Arap W. Biopanning and rapid analysis of selective interactive ligands #1141. *Proc Am Assoc Cancer Res* 42:213, 2001.



3. Kolonin MG, Arap W, **Pasqualini R**. Targeting Physiological and Pathological Blood Vessel Formation with in Vivo Phage Display #4416. Proc Am Assoc Cancer Res 42:822, 2001.
4. Oh YW, Mohiuddin I, Hong WK, Putnam J, Arap W, **Pasqualini R**. Bronchial and pulmonary artery perfusion of lung metastases #2193. Proc Am Assoc Cancer Res 42:407, 2001.
5. Arap W, Kolonin M, Trepel M, Baggerly K, Lahdenranta J, Giordano RJ, Cardó-Vila M, Yao V, Mintz PJ, Ardelt PU, Flamm A, Valtanen H, Weavind LM, Hicks M, Troncoso P, Pollock RE, Botz GH, Bucana C, Koivunen E, Cahill D, Pentz RD, Do KH, Logothetis CJ, **Pasqualini R**. Towards mapping the human vasculature by in vivo phage display #2928. Proc Am Assoc Cancer Res 43:591, 2002.
6. Ardelt PU, Wood CG, Chen L, Mintz PJ, Wright KC, Logothetis CJ, **Pasqualini R**, Arap W. Targeting of urothelial cells with internalizing peptides #2072. Proc Am Assoc Cancer Res 43:417, 2002.
7. Cardó-Vila M, Arap W, **Pasqualini R**. Contrasting properties of integrin cytoplasmic domains revealed by phage display #4181. Proc Am Assoc Cancer Res 43:844, 2002.
8. Cardó-Vila M, Arap W, **Pasqualini R**. Isolation of signaling molecule involved in angiogenesis mediated by beta 5 integrin cytoplasmic domain. Department of Army, Era of Hope, September 2002.
9. Giordano RJ, Lahdenranta J, Shapiro L, Arap W, **Pasqualini R**. Mass spectroscopy analysis of metalloproteases from tumor blood vessels: Aminopeptidase-N (CD13) activity upon angiogenic factors as a model #918. Proc Am Assoc Cancer Res 43:183, 2002.
10. Marchio S, Lahdenranta J, Trepel M, Giordano RJ, Shapiro L, Schlingemann RO, Wesseling P, Oosterwijk E, Valdembri D, Nanus D, Bussolino F, **Pasqualini R**, Arap W. Aminopeptidase A regulates angiogenesis and endothelial cell function #917. Proc Am Assoc Cancer Res 42:183, 2002.
11. Oh YW, Mohiuddin I, Liu T, Hong WK, Putnam J, McDonald D, Arap W, **Pasqualini R**. Visualization of microvasculature development in pulmonary metastases #4453. Proc Am Assoc Cancer Res 43:898, 2002.
12. Vidal CI, Broaddus RR, Lu KH, Ellis LM, Arap W, **Pasqualini R**. Identification of molecular markers in ovarian cancer #3013. Proc Am Assoc Cancer Res 43:608, 2002.
13. Vidal CI, Mintz PJ, Broaddus R, Lu K, Ellis LM, Arap W, **Pasqualini R**. Identification of molecular markers in ovarian cancer. The University of Texas M.D. Anderson Cancer Center SPORE in Ovarian Cancer Internal Retreat, Houston, TX, May 24, 2002.
14. Vidal CI, Mintz PJ, Broaddus R, Lu K, Ellis LM, Arap W, **Pasqualini R**. Identification of molecular markers in ovarian cancer. 10<sup>th</sup> Spore Investigator's Workshop, Chantilly, VA, July 13-16, 2002.
15. Bover LC, Holbeck S, Scudiero DA, Sausville E, **Pasqualini R**, Arap W. Targeting the NCI 60-cell panel by biopanning and rapid analysis of selective interactive ligands #4574. Proc Am Assoc Cancer Res 44:1049, 2003.
16. Bover LC, Holbeck S, Scudiero DA, Zurita AJ, Sausville E, **Pasqualini R**, Arap W. Targeting the NCI 60-Cell panel by biopanning and rapid analysis of selective interactive ligands. AACR-NCI-EORTC international conference: Molecular targets and cancer therapeutics, 2003.
17. Cardó-Vila M, Arap W, **Pasqualini R**.  $\alpha$ V $\beta$ 5 Integrin-dependent programmed cell death triggered by a peptide mimic of annexin V. Gordon Conference, 2003.

18. Chen L, Giordano RJ, Ardelt PU, **Pasqualini R**, Arap W. A bi-specific phage system for target discovery and delivery in cancer #4554. Proc Am Assoc Cancer Res 44:1044, 2003.
19. Ellerby HM, Lee S, Andrusiak R, Ellerby LM, Chen SF, Kiyota T, del Rio G, Sugihara G, Bredeisen DE, Arap W, **Pasqualini R**. A de novo designed protein with anti-tumor effects #6449. Proc Am Assoc Cancer Res 44:1478, 2003.
20. Hajitou A, Marini F, Lilley C, Moya C, Restel B, Arap M, Arap W, **Pasqualini R**. A new generation of targeted phage-based vectors for systemic gene delivery. Gordon Conference, 2003.
21. Kolonin MG, **Pasqualini R**. Analysis of human vascular proteome with phage display. Applied Biosystems, ABRF Conference, 2003.
22. Kolonin MG, Saha PK, Chan L, **Pasqualini R**, Arap W. Therapeutic targets of prohibition in adipose tissue vasculature. ASCI/AAP Joint Meeting, 2003.
23. Lahdenranta J, Giordano RJ, Langley R, Fidler IJ, **Pasqualini R**, Arap W. Selection of phage libraries on lung endothelium-derived cells by BRASIL and in vivo validation of a homing-peptide to the pulmonary vasculature #2763. Proc Am Assoc Cancer Res 44:631, 2003.
24. Langley RR, Lahdenranta J, Giordano R, Ramirez K, Tsan R, Arap W, **Pasqualini R**, Fidler IJ. Phenotypic diversity of endothelial cells, #2957. Proc Am Assoc Cancer Res, 44:675, 2003.
25. Mintz P, Kim J, Do KA, Wang X, Zinner RG, Cristofanilli M, Arap MA, Hong WK, Troncoso P, Logothetis CJ, **Pasqualini R**, Arap W. Fingerprinting the circulating repertoire of antibodies from cancer patients #5629. Proc Am Assoc Cancer Res 44:1290, 2003.
26. Oh YW, Mohiuddin I, Sun C, Putnam JB Jr, Hong WK, Arap W, **Pasqualini R**. Vasculature diversity in experimental melanoma metastases #5850. Proc Am Assoc Cancer Res 44:1342, 2003.
27. Zurita AJ, Troncoso P, Logothetis CJ, **Pasqualini R**, Arap W. A ligand peptide with potential for targeting prostate cancer metastatic to bone marrow #1659. 11<sup>th</sup> Spore Investigators Workshop. Proc Am Assoc Cancer Res 44:376, 2003.
28. Jaalouk DE, Kuniyasu A, Marini F, Ranta RM, Giordano R, Bover L, Sun C, Koivunen E, Arap W, **Pasqualini R**. Identification of therapeutic targets for leukemia by phage display profiling of leukemia cell lines and clinical samples. 12<sup>th</sup> SPORE Investigators' Workshop, 2004.
29. Juliana B, Giordano RJ, Kellen F, Oshiro SE, **Pasqualini R**, Arap W, Jorge K, Guilherme L. Phage display study using heart-infiltrating t-cell population rich in CD4+ isolated from rheumatic heart disease patients. 2004.
30. **Pasqualini R**. Combinatorial Screenings in Patients: The interleukin-11 receptor  $\alpha$  as a marker for targeted Induction of apoptosis in advanced prostate cancer. 12<sup>th</sup> SPORE Investigators' Workshop, 2004.
31. **Pasqualini R**, Arap W. Targeted nanotracers for in vivo imaging and tissue ablation. Alliance for Nanohealth Workshop, 2004.
32. Zurita AJ, Hajitou A, Cardó-Vila M, Troncoso P, Logothetis CJ, **Pasqualini R**, Arap W. Preclinical development of an interleukin-11 receptor-targeted pro-apoptotic peptide against advanced prostate cancer #3190. 40th Annual Meeting of The American Society Of Clinical Oncology. Proc ASCO 2004.

33. Alauddin MM, Hajitou A, Soghomonyan S, Ozawa MG, Balatoni J, **Pasqualini R**, Arap W, Gelovani J. Micro-pet imaging of HSV-tk gene delivery and expression with [18F]-feau in tumor-bearing mice. The International Society of Molecular Imaging, Copenhagen, Denmark, 2005.
34. Sharma P, Tang ND, Arap W, **Pasqualini R**. Combinatorial targeting of the NY-ESO-1 cancer testis antigen. Cancer Research Institute, 2005.
35. Petrache I, Arap W, **Pasqualini R**, Flotte T, Tudor RM. Diagnostic and therapeutic applications of bacteriophage associated virus technologies in pulmonary emphysema. *Nanomedicine* 2:294, 2006.
36. Takahashi S, Nishimura S, Kuniyasu A, Nakayama H, Jaalouk D, Arap W, **Pasqualini R**. Identification of leukemia targeting peptide ligand having cell penetrating activity. *J British Studies*, 2007.

**f. Book Chapters**

1. Brentani RR, **Pasqualini R**. Purification of the fibronectin receptor using the hydrophathy complementarity approach. In: *Receptor Purification*, The Humana Press Inc, 1:451-457, 1990.
2. Hemler M, Bodorova J, **Pasqualini R**. Adhesion structures: CD29. In: *Leukocyte Typing V*, A.S. 4/72, Oxford University Press, Oxford, 1994.
3. Hemler M, Weitzman J, **Pasqualini R**, Kawaguchi S, Kassner P, Berdichevsky F. Structure, biochemical properties, and biological functions of integrin cytoplasmic domains. In: *The Integrin: The Biological Problems*, CRC Press Inc, Boca Raton, FL, pp. 1-35, 1994.
4. Koivunen E, Restel BH, Rajotte D, Lahdenranta J, Hagedorn M, Arap W, **Pasqualini R**. Integrin-binding peptides derived from phage display libraries. In Howlett AR, eds. *Meth Mol Biol*, Humana Press, Inc., 129:3-17, 1999..
5. Schneller M, Arap W, **Pasqualini R**. Immunoblotting of integrins. *Meth Mol Biol* 129:63-78, 1999.
6. **Pasqualini R**, Arap W. Phage displayed peptides as tools to explore vascular heterogeneity. In: J Martinez, JA Fehrentz (eds.), *Peptides*, pp. 26-30: EPS/Edicion EDK, 2001.
7. **Pasqualini R**, Arap W. Translation of vascular proteomics into individualized therapeutics. In: *Pharmacogenomics in Search for Individualized Therapies*, Wiley-VCH Press, pp. 525-530, 2002.
8. **Pasqualini R**, Arap W. Vascular targeting. In: *The Encyclopedia of Cancer*, Ed. Joseph R. Bertino, Academic Press Inc., New Brunswick, NJ, Second edition, Vol 4, pp. 501-7, 2002.
9. **Pasqualini R**, Arap W. Profiling the molecular diversity of blood vessels. *Cold Spring Harbor Symposia on Quantitative Biology*, Vol 67, pp. 223-5, 2002.
10. Kolonin M, **Pasqualini R**, Arap W. Mapping human vascular heterogeneity by in vivo phage display. In: *Genetics of Angiogenesis*, Ed. James B. Hoying, BIOS Scientific Publishers Ltd, Oxford, Ch.11: pp.181-187, 2003.
11. Vidal C, Cardó-Vila M, Lahdenranta J, Arap W, **Pasqualini R**. Targeting blood vessels in vivo by using phage display libraries. In: *Targeted Therapy for Cancer*, K.N. Syringos and K.J. Harrington, eds. (New York, NY, Oxford University Press Inc.), pp 250-255, 2003.

12. Lahdenranta J, Arap W, and **Pasqualini R**. The use of proteomics to map phenotypic heterogeneity of the endothelium. In: Aird W.C., eds. Endothelial Cells In Health and Disease, Taylor & Francis, pp 105-119, 2005.
  13. Christianson DR, Ozawa MG, **Pasqualini R**, Arap W. Techniques to decipher molecular diversity by phage display. In Cardiovascular Proteomics book in Methods in Molecular Biology, Humana Press. 357:385-406, 2006.
  14. Trepel M, Arap W, **Pasqualini R**. Selection, isolation, and identification of targeting peptides for ligand-directed gene delivery. Gene Transfer, Delivery and Expression of DNA and RNA: A Laboratory Manual. In: Friedman and Rossi, eds, Cold Spring Harbor Laboratory Press, New York. Chapter 30, pp. 359-369, 2007.
  15. Cardó-Vila M, Vidal CI, Lahdenranta J, Arap W, **Pasqualini R**. Blood vessels as a target for cancer therapy. In: Syrigos, Harrington, eds. Targeted Therapy for Cancer. (In Press)
  16. Zurita AJ, Arap W, **Pasqualini R**. Molecular characterization of the endothelium: A phage display perspective the endothelium. In: A Comprehensive Reference, The Endothelial Cell as Input-Output Device/Output/Proteome, Ed. Aird WC., Marcel Dekker, Inc. (In Press)
- g. Books (edited and written)**
1. **Pasqualini R**, Arap W (eds.), Protein Discovery Technologies, Principles, Methods and Applications, Marcel Dekker/CRC Press, New York. (In Press).
- h. Letters to the Editor**  
N/A
- i. Manuals, Teaching Aids, Other Publications**
1. **Pasqualini R**, Arap W, Rajotte D, and Ruoslahti E. In vivo selection of phage-display libraries. In: C. F. Barbas, III, D. R. Burton, J. K. Scott, and G. J. Silverman (eds.), Phage Display: A Laboratory Manual, Chapter 22, pp. 1-24, New York: Cold Spring Harbor Laboratory Press, 2000.
- j. Other**  
N/A

## **EDITORIAL AND REVIEW ACTIVITIES**

### **Editor/Service on Editorial Board(s)**

Editor, Microvascular Research  
 Editor, Frontiers in Bioscience  
 Editor, Cancer Biology and Therapy  
 Editor, Molecular Cancer Research  
 Editor, Protein Discovery, CRC Press  
 Editor, Advanced Drug Delivery Review  
 Editor, Angiogenesis  
 Associate Editor, Cancer Research

### **Journal Reviewer**

Nature  
 Nature Medicine  
 Nature Biotechnology  
 Nature Methods  
 Science  
 PNAS  
 BLOOD  
 EMBO Journal  
 Cancer Cell

J Clin Invest  
Chemistry & Biology  
Eur J Biochem  
Cancer Research  
Cancer Biology and Therapy  
Molecular Cancer Therapeutics  
Gene Therapy  
Human Gene Therapy  
Molecular Therapy  
The American Journal of Pathology  
Microvascular Research  
Pharmacogenomics Journal  
International J of Cancer  
Clinical Cancer Research  
J Natl Cancer Institute  
Trends in Mol Med  
Acta Biochem and Biophys Syn  
Br J Cancer  
Int J Rad Oncol  
Arteriosclerosis, Thrombosis, and Vascular Biology  
BioTechniques  
FEBS J

## **TEACHING**

### **Within Current Institution**

#### **Formal Teaching**

##### **Courses Taught**

Instructor, GS04 0153, Human Gene Therapy: Basic Science/Clinical Trial, 2000

Instructor, GS04 0212, Mechanisms Cancer Therapeutics, 2002

Instructor, The University of Texas Medical School, Vascular Biology Course, 2004, 2005

Instructor, The University of Texas Medical School, Gene Therapy Course, 2002, 2003

#### **Training Programs**

Member, Virology and Gene Therapy, 1999 - Present

Program Mentor, CCSG – Cancer Biology & Metastasis Program, 1999 – Present

Program Mentor, Gene Targeting and Therapy Program, 1999 – Present

Program Mentor, GU Program, 1999 – Present

Program Mentor, Pharmacoinformatics Training Grant, 2004 – Present

Member, Vascular Biology, 2004 – Present

Member, Howard Hughes Medical Institute Graduate Training Grant entitled "Translational Bioengineering for Cancer Diagnostics and Therapeutics", 2006 – 2009

#### **Other Educational Programs (since relocation to the University of Texas M. D. Anderson Cancer Center)**

Information Exchange, Department of Molecular Genetics, 2000

Board of Visitors Annual Meeting, 2000

Department of Bioimmunotherapy, Division of Medicine Seminar, 2000

Office of Education, Summer Research Conference, Pre-Clinical Animal Models in Prostate Cancer Research, 2000

The University of Texas M. D. Anderson Cancer Center "Research Council, 2001

Pancreatic Cancer Workshop, 2001

Grand Rounds, Division of Radiation Oncology, 2001

Angiogenesis MRP, 2001

Patient Conference "Circle of Life" held at the Omni Houston Hotel Westside, 2001

Medical Oncology Fellows Conference, 2001

The Marcus Foundation Luncheon and Tour, 2001

Panel Presentation at the Anderson Network 13<sup>th</sup> Annual "Living Fully with Cancer", 2002

Grand Rounds, Division of Cancer Medicine, 2002

Angiogenesis Workshop, Society of Biological Therapy, San Diego, CA, 2003

Nanotechnology Summit, Houston, TX, 2004

Chair, Institutional Grand Rounds, 2004

Gillson-Longenbaugh Foundation, 2004

### **Supervisory Teaching**

#### **Advisory Committees and/or Supervisory Committees**

Summer Tutorial Research Experiment, Joyce Philips, The University of Texas-Houston Medical School, Houston, TX, 2001

Summer Tutorial Research Experiment, Sharon Fernandez, The University of Texas-Houston Medical School, Houston, TX, 2001 – 2002

Member, Advisory and Supervisory Committee, G.S.B.S., Catherine Papasakelariou (M.S.) 05/08/02 – 08/15/02

Member, Advisory/Supervisory Committee, G.S.B.S., Ryan Von Lindern, 2002

Member, Advisory/Supervisory Committee, G.S.B.S., Marya McCarty (Ph.D.) 2002

Member, Advisory Committee, G.S.B.S., Thomas Merritt (Ph.D.) 2002 – Present

Member, Advisory Committee, G.S.B.S., Sarah Dunlap (Ph.D.) 2004 – Present

Member, Advisory/Supervisory Committee, G.S.B.S., George Wang, 2003-Present

Member, Advisory Committee, G.S.B.S., Melanie Dujka (Ph.D.) 2004 – Present

Member, Advisory Committee, G.S.B.S., Jayaganesh Natarajan (Ph.D.) 2004 – Present

Member, Advisory and Supervisory Committee, G.S.B.S., Claudia Vidal (M.D., Ph.D., 2003-2004

Chair, Advisory Committee, G.S.B.S., Catherine Moya (Ph.D.) 2003 – 2006

Tutorial Supervised, Jennifer Dembinski, 2002

Tutorial Supervised, Catherine Moya, 2002-2003

Tutorial Supervised, Dawn Christianson, 2004

Chair, Advisory Committee, G.S.B.S., Dawn Christianson (Ph.D.) 05/19/04 – Present

Arap/Pasqualini Laboratory Summer Research Program, Tracey Smith, Baylor University, Summer 2005

Arap/Pasqualini Laboratory Summer Research Program, Alicia L. Patterson, Massachusetts Institute of Technology, Summer 2006

Arap/Pasqualini Laboratory Summer Research Program, Shannon Nees, Massachusetts Institute of Technology, Summer 2006

Arap/Pasqualini Laboratory Summer Research Program, Jeffrey A. Easley, Massachusetts Institute of Technology, Summer 2006

Arap/Pasqualini Laboratory Summer Research Program, Julianna K. Edwards, Massachusetts Institute of Technology, Summer 2006

Arap/Pasqualini Laboratory Summer Research Program, Tracey Smith, Baylor University, Summer 2006

Arap/Pasqualini Laboratory Visiting Student, Laura Lattanzio, Institute for Cancer Research and Treatment, University of Turin Medical School, Candiolo, Italy, 2006

Supervisory/Advisory Committee, George Wang, M.D., Ph.D., University of Texas, 2006

#### **Examining Committee Participation**

Chair, Claudia Vidal, 05/03/02

Chair, Catherine Moya, 02/20/06

#### **Supervisory Committees from Other Institutes**

Goran Mason, B.S., Graduate Student, Karolinska Institute, Sweden, 1998

Gordon Tang, M.D., Neurosurgery Fellow, Harvard Medical School, Boston, MA, 1998

Bradley Restel, B.S., Research Technician, Medical Student, University of Texas-San Antonio, San Antonio, TX, 1999 – 2001

Carlotta Cavazos, B. S., Research Technician, Physician Assistant School, Baylor College of Medicine, Houston, TX, 1999 – 2001

Visiting Graduate Student, Olaf Broders, University of Heidelberg, Germany, 2000

Visiting Graduate Student, Margaret Magdesian, University of Saó Paulo, Saó Paulo, Brazil, 2000

Visiting Graduate Student, Mark LaBarge, Stanford University, Stanford, CA, 2001

Undergraduate Tutorial, Katherine Leskin, MIT, Summers 2003 and 2004

Graduate Student Tutorial, Fernanda Staquicini, University of Saó Paulo, Brazil, 2004

Graduate Student Tutorial, Michael Stefandakis, University of Helsinki, Finland, 2004

Johanna Lahdenranta, The University of Helsinki, Finland

Marina Cardó-Vila, University of Barcelona, Spain

#### **Direct Supervision**

##### **Undergraduate and Allied Health Students**

N/A

##### **Medical Students**

Claudia Vidal, M.D., Ph.D. Program, 2002 – 2004, Surgical Resident, University of Pennsylvania

Michael Ozawa, M.D., Ph.D. Program, 2005 - present

##### **Graduate Students**

Marina Cardó-Vila, graduated 2003

Catherine Moya, 2003 – 2005

Johanna Lahdenranta, 1998 - 2004, graduated 2004

Dawn Christianson, 2004 – Present

Jessica Sun, 2005 – Present

Alessandro Kelien Lee, 2006 – Present

Tracey Smith, 2006 – Present

Danielle O'Connell, 2007 - Present

Aaisha Hussain, 2007 - Present

##### **Postdoctoral Research Fellows**

Virginia Yao, Ph.D., Postdoctoral Fellow, Senior Research Fellow, University of California, San Francisco, CA, 1999 – 2001

Paul Mintz, Ph.D., Postdoctoral Fellow, 1999 – 2003

Instructor, The University of Texas M. D. Anderson Cancer Center, 2003-2006

Associate Professor, Imperial College, UK, 2006-present

Martin Trepel, M.D., Postdoctoral Fellow, Assistant Professor, University of Freiburg, Germany, 2000 – 2001

Peter Ardelt, M.D., Postdoctoral Fellow, Urology Resident, Forschungszentrum Borstel,



Germany, 2000 – 2002

Limor Chen, Ph.D., Postdoctoral Fellow, Senior Research Scientist, Dr. Robert Kerbel's Laboratory, Canada, 2000 – 2003

Mikhail Kolonin, Ph.D., Postdoctoral Fellow, 2000 – 2003  
Instructor, The University of Texas M. D. Anderson Cancer Center, 2003-2007  
Assistant Professor, Institute for Molecular Medicine, Houston, TX, 2007-present

Amado Zurita, M.D., Postdoctoral Fellow, 2001 – 2007  
Assistant Professor, The University of Texas M. D. Anderson Cancer Center, 2007-present

Marco Arap, M.D., Postdoctoral Fellow, 2002 – 2003  
Assistant Attending Physician and Assistant Professor of Urology USP, 2003 - present

Laura Bover, Ph.D., Postdoctoral Fellow, 2003 – 2004, Research Scientist Immunology

Marina Cardó-Vila, Ph.D., Postdoctoral Fellow, 2003 – Present  
Susan G. Komen Fellow, 2006-2009

Glauco Souza, Ph.D., Postdoctoral Fellow, 2003 – Present  
Recipient of The Jay and Lori Eisenberg Endowed Fellowship  
Recipient of The Marion D. Edwards Fellowship

Diana Jaalouk, Ph.D., Postdoctoral Fellow, 2003 – 2006  
Recipient of the Kimberly Patterson Fellowship in Leukemia Research Award, 2006

Ricardo Giordano, Ph.D., Postdoctoral Fellow, 2004 – 2007  
Instructor, UTMDACC, 2007-present

Liliana Guzman-Rojas, Ph.D., Postdoctoral Fellow, 2004 – Present

Johanna Lahdenranta, Ph.D., Postdoctoral Fellow, Harvard Medical School, 2004 – 2005

Roberto Rangel, Ph.D., Postdoctoral Fellow, 2004 – Present  
Dr. Rangel is the recipient of the Scientific Achievement Fund for Odyssey Fellowship, 2006 – 2008

Fernanda Staquicini, University of São Paulo, 2004 – Present

Diana Noronha Nunes, Postdoctoral Fellow, 2006 – Present

Jami Mandelin, Postdoctoral Fellow, 2006 – Present

Jaesung Kim, Postdoctoral Fellow, 2007 – Present

Masanori Sato, Postdoctoral Fellow, 2007 - Present

**Clinical Residents and Fellows/Faculty**

Michael Wang, M.D., Assistant Professor, Department of Lymphoma, The University of Texas M. D. Anderson Cancer Center

Ziong Lee, M.D., Oncology Practice

Yun Oh, M.D., Assistant Professor, Department of Thoracic/Head and Neck Medical Oncology, The University of Texas M. D. Anderson Cancer Center

Paul Mintz, Ph.D., Instructor, 1999 – Present

Mikhail Kolonin, Ph.D., Instructor, 2003 – Present

Padmanee Sharma, Assistant Professor, 2004 – 2005

Emmanuel Dias-Neto, Visiting Assistant Professor, 2006 – Present

Benjamin J. Moeller, 2007-present

#### **Visiting Scientists**

Luisa Villa, Ph.D., Professor, University of São Paulo, Brazil (Sabbatical)

Erkki Koivunen, Ph.D., Associate Professor of Biochemistry, University of Helsinki, Finland, 2000 – 2004

Serena Marchiò, Ph.D., Graduate Student, University of Torino, Italy, 2000, 2004

Flavio Curnis, Ph.D., Graduate Student, San Raffaele H. Scientific Institute, Milan, Italy, 2000

Luiz Rizzo, M.D., Ph.D., Associate Professor of Immunology, University of São Paulo, Brazil, 2002 (Sabbatical)

Akihiko Kuniyasu, Associate Professor, Dept. of Biochemistry, Kumamoto University, Kumamoto, Japan, 2003 – 2004 (Sabbatical)

E. Helene Sage, Ph.D., Professor and Director, The Heart Hope Institute, Seattle, 2003, 2004 (Sabbatical)

Emmanuel Dias Neto, Ph.D., Researcher and Deputy-director of the Laboratory of Neurosciences, Instituto de Psiquiatria - Faculdade de Medicina - Univ. de São Paulo, 2005 (Sabbatical)

Diana Nunez, Ph.D., Researcher and Deputy-director of the Laboratory of Neurosciences, Instituto de Psiquiatria - Faculdade de Medicina - Univ. de São Paulo, 2005 (Sabbatical)

Erkki Koivunen, Ph.D., Associate Professor of Biochemistry, University of Helsinki, Finland, 2005 (Sabbatical)

Houston Miller, Ph.D., Professor of Chemistry, George Washington University, Washington, DC, 2005 (Sabbatical)

Serena Marchio, Ph.D., Staff Scientist, APAvadis Inc., Torino Italy/University of Torino, 2007

#### **Teaching Outside of Current Institution Formal Teaching**

**Courses Taught**

Instructor, Ph.D. training program in translational bioengineering for cancer diagnostics and therapeutics, Rice University and The University of Texas M. D. Anderson Cancer Center, 2006

**CONFERENCES AND SYMPOSIA****Organization of National or International Conferences/Symposia (Including chairing session)**

Chair, IBC meeting in Molecular Evolution, Boston, MA, 1997

Chair, Extracellular Matrix and Cell Function, SIMEC, Rio de Janeiro, Brazil, 1998

Chair, ASGT Angiogenesis Educational session, Denver, CO, 2000

Chair, Targeted Therapies, 11th NCI-EORTC-AACR Symposium, 2000

Co-organizer, Chair, Phage Display Technology, CHT meeting, Boston, MA, 2000

Chair, ASGT Angiogenesis Educational session, Seattle, WA, 2001

Scientific Advisory Board, Chair, Phage Display Technology, CHT meeting, Boston, MA, 2001

Chair, Vector Targeting Strategies for Therapeutic Gene Delivery, Cold Spring Harbor, NY, 2001

Chair, Novel Targeted Therapies, AACR, New Orleans, LA, 2001

Chair, Angiogenesis Regulation and Vascular Targeting, 2001

Mini-symposium, AACR, 2001

Chair, Targeted Therapies, AACR-NCI-EORTC meeting, Miami, FL, 2001

Organizing Committee, EORTC-NCI-AACR Symposium, Mol. Targets, Frankfurt, Germany, 2002

Scientific Advisory Board, Phage Display Technology, CHT meeting, Boston, MA, 2002

Chair, 67<sup>th</sup> Cold Spring Harbor Symposium on Quantitative Biology: The Cardiovascular System, Cold Spring Harbor Laboratories, Cold Spring Harbor, NY, 2002

Scientific Advisory Board, Phage Display Technology, CHT meeting, Boston, MA, 2003

Chair, Tumor Microenvironment, 94<sup>th</sup> AACR Annual Meeting, 2003

Chair, CHT Institute, Molecular Display, Boston, 2003

Chair, Tumor Microenvironment, AACR 97<sup>th</sup> Annual Meeting, 2003

Member, Special Conferences Committee, AACR, 2003-2006

Member, AACR Special Conference Committee, Cancer Proteomics, 2004

Co-Chair, AACR Special Conference: Basic, Translational, and Clinical Advances in the Management of Prostate Cancer, 2004

Co-Chair, Tumor Microenvironment Minisymposium, AACR Annual Meeting, 2004

Member, M. D. Anderson Cancer Center, Sister Institution Conference, South America Partnership Meeting Organizing Committee, 2005/2006

Co-Chair, The 2006 Miami Nature Biotechnology Winter Symposium: Angiogenesis in Cancer and Vascular, 2006

Member, Scientific Program Committee for the 5<sup>th</sup> Annual Meeting of the Society for Molecular Imaging, 2006

Co-Chair, AACR Special Conference: Innovations in Prostate Cancer, 2006

Member, Scientific Program Committee for the 6<sup>th</sup> Annual Meeting of the Society for Molecular Imaging, 2007

Organizing Committee, Session Chair, International Society of Biological Therapy, 2007

**Presentations at National or International Conferences**

**Invited (since relocation to The University of Texas M. D. Anderson Cancer Center)**

Cold Spring Harbor, "Vector Targeting Strategies for Therapeutic Gene Delivery, NY, 03/99

Phage Display, Therapeutics and Diagnostics, CHI, Boston, MA, 03/99

American Society of Gene Therapy, Washington DC, MD, 06/99

International Symposium in Radionuclides, St. Louis, MO, 06/99

Signaling and Angiogenesis UICC Course, Tamsvik, Sweden, 08/1999

Gordon Research Conference in Angiogenesis, Salve Regina, RI, 08/99

Gordon Research Conference in Central Nervous System, RI, 08/99

Grantee National Meeting, The Susan G. Komen Foundation, Dallas, TX, 10/99

Course on Phage Antibodies, Cold Spring Harbor Laboratories, CSH, NY, 11/99

International Symposium in Angiogenesis, Milan, Italy, 11/99

Novartis Symposium in Vascular Biology, Basel, Switzerland, 11/99

Therapeutic Control of Angiogenesis, London, UK, 01/00

Gordon Research Conference, Drug Delivery, Ventura, CA, 02/00

Human Gene Therapy Course, The University of Texas M. D. Anderson Cancer Center, Houston, TX, 02/00

Clinical and Biological Aspects of Urothelial Cancer, Houston, TX, 03/00

International Meeting on Angiogenesis, Experimental and Clinical, The Netherlands, 04/00

Phage Display, Diagnostics and Therapeutics, CHI, Boston, MA, 04/00

FASEB Symposium on Angiogenesis and Signaling, San Diego, CA, 04/00

Swedish Society of Oncology, Nobel Forum, Karolinska Institute, Stockholm, Sweden, 05/00

American Society of Gene Therapy 3<sup>rd</sup> Annual Meeting, Denver, CO, 05/00

National Heart, Lung, and Blood Institute, Meeting on Vascular Heterogeneity, 06/00

UTOPIA Workshop, Heidelberg, Germany, 07/00

American Urological Association, 07/00

International Symposium on Apoptosis, Caxambu, Brazil, 08/00

26<sup>th</sup> European Peptide Symposium, Montpellier, France, 09/00

Understanding Phage Display: Structure, Biology and Applications, Vancouver, Canada, 09/00

Metastasis Research Society, London, UK, 09/00

International Meeting on Angiogenesis, Montreal, Canada, 10/00

11th NCI-EORTC-AACR Symposium, The Netherlands, 11/00

Josef Steiner Foundation Symposium, Basel, Switzerland, 01/01

Euroconference in Angiogenesis, Paris, France, 03/01

American Association for Cancer Research Annual Meeting, New Orleans, LA, 03/01

Phage Display, Diagnostics and Therapeutics, CHI, Boston, MA, 04/01

European Meeting in Angiogenesis, Liege, Belgium, 04/01

International Course on Angiogenesis and Signal Transduction, Sicily, Italy, 04/01

Angiogenesis I & II, American Society of Gene Therapy, Seattle, WA, 05/01

Controlled Release Society Annual Meeting, San Diego, CA, 06/01

Macromolecular Drug Delivery Conference, Breckenridge, CO, 07/01

International Conference on Angiogenesis and Tumors, Paris, France, 09/01

INSERM College de France, Paris, France, 09/01

Imaging in 2020 Conference, WY, 09/01

Cancer Research Institute Symposium, Antibodies in Cancer, New York, NY, 10/01

Forbeck Meeting in Vascular Permeability, Napa Valley, CA, 10/01

AACR-NCI-EORTC International Conference, Miami, FL, 10/01

Cold Spring Harbor Laboratory Course on Phage Display of Combinatorial Antibody Libraries,  
Cold Spring Harbor Laboratories, Cold Spring Harbor, NY, 11/01

International Meeting in Molecular Imaging, Orlando, FL, 01/02

Annual Genitourinary Oncology Conference, The University of Texas M. D. Anderson Cancer  
Center, Houston, TX, 02/02

NCI, Vascular Biology Faculty Retreat, Washington, DC, 02/02

Division of Cancer Treatment and Diagnosis, NCI, Annapolis, MD, 03/02

American Association for Cancer Research 93<sup>rd</sup> Annual Meeting, San Francisco, CA, 04/02

Tumor Microenvironment: Biology and Therapeutic Implications, Round Top, TX, 04/02

67<sup>th</sup> Cold Spring Harbor Symposium on Quantitative Biology: The Cardiovascular System, Cold  
Spring Harbor Laboratory, Cold Spring Harbor, NY, 05/02

Middle East Medical Assembly, Beirut, Lebanon, 05/02

Liposome Research Days Inc. - MDC, Berlin, Germany, 05/02

Novo Nordisk Foundation Consortium Symposium, Upplands Vasby, Sweden, 05/02

Symposium on Angiogenesis in Oncology and Hematology, Muenster, Germany, 07/02

NCI-Interdisciplinary Research Teams for Molecular Target Assessment, Seattle, WA, 08/02

1<sup>st</sup> International Congress on Targeted Therapies, Washington, DC, 08/02

Department of Defense, Breast Cancer Research Program Meeting, Orlando, Florida, 10/02

Brain Endothelium and Pathologies, ISERM, Paris, France, 10/02

American Society for Extracellular Matrix, Houston, TX, 11/02

International Symposium on Head and Neck Cancer, Puerto Rico, 01/03

U.S. – Japan Workshop, "Tumor-Specific Delivery by Non-Viral Systems: Approaching a Reality,"  
Maui, HI, 02/03

U.S. - Japan Cooperative Medical Science Program, Environment Genomics and Carcinogenesis  
Panel, Kyoto, Japan, 03/03

American Association for Cancer Research 97<sup>th</sup> Annual Meeting, Washington DC, 04/03

2<sup>nd</sup> European Society of Combinatorial Sciences (ESCS) Society Symposium, Copenhagen,  
Denmark, 06/03

4<sup>th</sup> Symposium on the Biology of Endothelial Cells, Munich, Germany, 07/03

International Meeting, "How Close Are We From Cancer," São Paulo, Brazil, 08/03

Gordon Research Conference: Angiogenesis and Microcirculation, Newport, RI, 08/03

Wenner-Gren Foundation International Symposium, Biology of Tumor Stroma: Potential Avenues in Tumor Therapy, Stockholm, Sweden, 09/03

Molecular Targets NCI Workshop, Philadelphia, PA, 10/03

Ludwig Institute Cancer Center, London, England, 10/03

Vanderbilt-Ingram Cancer Center Proposal for Proteomics-Bases Collaboration: Use of Circulating Antibodies to Discover Tumor Antigens, Nashville, TN, 10/03

U01 Mini Workshop, Contrasting Properties of Integrin Cytoplasmic Domains, Philadelphia, PA, 10/03

European School of Hematology/The University of Texas M. D. Anderson Cancer Center Conference: Mechanisms of Cell Death and Disease: Advances in Therapeutic Interventions, Cancun, Mexico, 11/03

Department of Defense, Generals Meeting on Homeland Security, Baltimore, MD, 12/03

NCI, Frederick, Maryland, 11/03

Phage Display of Combinatorial Antibody Libraries at Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, 11/03

Institutional Grand Rounds, The University of Texas M. D. Anderson Cancer Center, Houston, TX, 02/04

Cellular, Molecular, and Tumor Biology, 95<sup>th</sup> Annual AACR Meeting, Orlando, FL, 03/04

Mayo Oncology Society, April Oncology Society Presentation, Rochester, MN, 04/04

Alliance for NanoHealth Workshop, Texas Heart Institute, Denton Cooley Auditorium, Houston, TX, 05/04

Thomas L. Petty Aspen Lung Conference 47<sup>th</sup> Annual Meeting on Cellular and Molecular Pathobiology of Pulmonary Hypertension, Aspen, CO, 06/04

32<sup>nd</sup> Meeting of the International Society for Oncodevelopmental Biology and Medicine (ISOBM), Helsinki, Finland, 06/04

Endothelial Cell Phenotypes in Health and Disease Gordon Research Conference, 07/04

12<sup>th</sup> SPORE Investigator's Workshop, Baltimore, MD, 07/04

Winship Cancer Institute, Emory University School of Medicine, Atlanta, GA, 08/04

Gordon Research Conference, Endothelial Cell Phenotypes in Health & Disease, Andover, NH, 08/04

Grover Conference on the Pulmonary Circulation: Genetic and Environmental Determinants of Pulmonary Endothelial Cell Function, Sedalia, CO, 09/04

3<sup>rd</sup> International Symposium on Extracellular Matrix (SIMEC), Rio de Janeiro, Brazil, 09/04

2<sup>nd</sup> "Biologie Prospective" Santorini Conference, Santorini, Greece, 09/04

1<sup>st</sup> European Conference on Tumor Angiogenesis and Antiangiogenic Therapy, Munich, Germany, 10/04

NIH CIP Workshop on High-Throughput Technologies, Washington, DC, 11/04

AACR: Basic, Translational, and Clinical Advances in Prostate Cancer, Bonita Springs, FL, 11/04

Symposium New Therapies in Cancer, Centro Nacional de Investigaciones Oncologicas, Madrid, Spain, 11/04

Imperial College, London, England, 11/04

Gordon Research Conference: Fibronectin, Integrins & Related Molecules, Ventura, CA, 01/05

AACR Special Conference Committee Meeting, Miami Beach, FL, 01/05

Advances in Oncology Institutional Grand Rounds, The University of Texas M. D. Anderson Cancer Center, Houston, TX, 01/05

National Heart, Lung and Blood Institute, Bethesda, MD, 04/05

Liver Cancer Institute, Fudan University, Shanghai, China, 05/05

Research Centre of Cancer, Faculty of Medicine, The University of Hong Kong, Hong Kong, 05/05

12<sup>th</sup> Annual Scientific Retreat, Prostate Cancer Foundation, Phoenix, AZ, 09/05

Department of Biological and Technological Research of San Raffaele H Scientific Institute, Milan, Italy, 10/05

Institute for Cancer Research and Treatment, Candiolo, Torino, Italy, 10/05

Annual Advisory Board Meeting of the Prostate Cancer Research Program, Houston, TX, 11/05

6<sup>th</sup> Peter MacCallum Cancer Symposium, Melbourne, Australia, 11/05

National Cancer Center Research Institute, Tokyo, Japan, 12/05

Sapporo Medical University School of Medicine, Sapporo, Japan, 12/05

Speaker, 2006 Miami Nature Biotechnology Winter Symposium, Days of Molecular Medicine: Angiogenesis in Cancer and Vascular Disease, Miami, FL, 02/06

Speaker, Present Project 7 Progress, Houston, TX, 02/06

Speaker, The University of São Paulo, Radiation Oncology Program, São Paulo, Brazil, 3/06

Speaker, Association of Health Care Journalists Conference, Houston, TX, 03/06



Speaker, Bioengineering Graduate Course, Rice University, Houston, TX, 03/06

Speaker, The University of Kumamoto, Kumamoto, Japan, 04/06

Speaker, Western Review Consortium 2006 Peer Review Committee, Salt Lake City, UT, 04/06

Speaker, Department of Cellular and Integrative Physiology Seminar, Indianapolis, IN, 04/06

Speaker, The MDACC-Severance Symposium 2006, Seoul, Korea, 05/06

PMT Distinguished Seminar Speaker, University of North Carolina, Chapel Hill, NC, 05/06

Speaker, University of Basel and University of Freiburg, Freiburg, Germany/Basel, Switzerland, 05/06

Speaker, Rockefeller University, New York, NY, 05/06

Speaker, BD Technologies, Research Triangle Park, NC, 05/06

Speaker, 2<sup>nd</sup> Annual M. D. Anderson Cancer Center Sister Institution Conference, Houston, TX, 06/06

Speaker, 2<sup>nd</sup> Joint American-Israeli Conference on Cancer: Novel Therapeutic Approaches to Cancer, Jerusalem, ISRAEL, 06/06

Invited Speaker, Research Conference, Department of Lymphoma/Myeloma, The University of Texas M. D. Anderson Cancer Center, Houston, TX, 06/06

Invited Speaker, Division of Cancer Medicine, The University of Texas M. D. Anderson Cancer Center, Houston, TX, 07/06

Chair, The University of Texas M. D. Anderson Cancer Center Grand Rounds, Houston, TX, 07/06

Speaker, 14<sup>th</sup> Spore Investigator's Workshop, Baltimore, MD, 07/06

Speaker, Aspen Seminar and Hines Reception, Aspen, CO, 07/06

Speaker, The V Foundation Awardees Annual meeting, Napa Valley, CA 07/06

Invited Speaker, Department of Bioengineering, Rice University, Houston, TX, 08/06

Speaker, IGR-MDACC International Scientific Symposium/Sister Institution, Extramural Program, Paris, France, 09/06

Speaker, 4<sup>th</sup> Annual Angiogenesis & Vascular Targeting Agents Drug Discovery & Development World Summit, Boston, MA, 09/06

Speaker, Bastrop Veterinarian Team Meeting; GLP Pre-Clinical Work for Anticancer Peptides (For Spore and Leukemia Grant and IMPACT Grant), Bastrop, TX, 09/06

Speaker, Prostate Cancer Foundation 13<sup>th</sup> Annual Scientific Retreat, Scottsdale, AZ, 10/06

Speaker, Diagnosis and Therapeutic Discovery in Neuro-Oncology Conference, Houston, TX, 10/06

Speaker, Clontech, Mountain View, CA, 10/06

Speaker, A.C. Camargo/Sister Institution, Extramural Program, São Paulo, Brazil, 10/06

Speaker, Biogen, Boston, MA, 11/06

Speaker, 18<sup>th</sup> EORTC-NCI-AACR Symposium, Prague, Czech Republic, 11/06

Speaker, 6<sup>th</sup> Edition of Amazon Project Conference on Cancer, Palermo, Italy, 11/06

Speaker, San Raffaele Hospital, Milan, Italy, 11/06

Speaker, Arap/Pasqualini Program Retreat, San Francisco, CA, 12/06

Speaker, University of Texas M. D. Anderson Cancer Center, Grand Rounds, Houston, TX, 01/07

Speaker, Nano Medicine Annual Symposium, Helsinki, Finland, 01/07

Speaker, International Symposium on Polymer Therapeutics (ISPT 07), Berlin, Germany, 02/07

Speaker, 2007 Advances in Oncology: Emerging Trends, Targets, and Approaches to Solid Tumors Symposium, Houston, TX, 03/07

Speaker, Memorial-Sloan Kettering Cancer Center, Molecular Pharmacology & Chemistry Seminar, New York, NY, 03/07

Speaker, Steele Laboratory Interactive Tumor Biology Seminar Series, Massachusetts General Hospital, Boston, MA, 04/07

Speaker, Stanford University, Palo Alto, CA, 04/07

Speaker, McGill Cancer Centre, Montreal, Canada, 04/07

Member, Odyssey Mini Symposium, Grand Rounds and Luncheon, The University of Texas M. D. Anderson Cancer Center, Houston, TX, 05/18/07

Speaker, Imaging Short Course, Rice University, Houston, TX, 05/21/07

Speaker, 2007 Days of Molecular Medicine, Emerging Technologies and Cancer Biology Symposium, Cambridge, MA, 05/21/07–05/23/07

Speaker, BIT's 5<sup>th</sup> Anniversary, The Conference and Expo of International Drug Discovery Science and Technology (IDDST), China Roles for Global Drug Innovations, Shanghai, China, 05/27/07-05/31/07

Gene and Drug Delivery Systems (GDD) Study Section, Bethesda, MD, 06/06/07-06/08/07

Speaker, Annual Meeting of the European Society for Molecular Imaging, Naples, Italy, 06/14/07-06/15/07

Speaker, Michale E. Keeling Center for Comparative Medicine and Research, Department of Veterinary Sciences, Bastrop, TX, 07/20/07-07/24/07

**Other, Including Scientific Exhibitions**

Aventis, Frankfurt, Germany, 7/00

Elan Corporation, Dublin, Ireland, 09/00

Aventis, San Jose, CA, 02/01

Ely Lilly Corporation, Indianapolis, IN, 10/01

AstraZeneca, Waltham, MA, 12/01

Becton Dickson, North Carolina, 01/03

Novartis, San Diego, 01/03

Abgenix, San Francisco, 03/03

Texas Academy of Science, Engineering and Medicine (Academy) Inaugural Conference, 01/04

Abgenix, Burnaby BC, Canada, 01/04

Pfizer Global Research and Development Seminar, San Diego, CA, 04/05

BD Technologies, Research Triangle Park, NC, 05/06

Clontech, Mountain View, CA, 10/06

Biogen, Boston, MA, 11/06

**Seminar Invitations from Other Institutions**

University of Texas Southwestern, Dallas, TX, 1999

Vascular Biology Seminar, Harvard Medical School, Boston, MA, 1999

Cell and Molecular Biology Seminar, MGH, Boston, MA, 1999

Sidney Kimmel Cancer Center, La Jolla, CA, 1999

Gene Therapy Program, University of California-San Diego, CA, 1999

Seminar Series, Wayne University, Detroit, MI, 1999

Seminar Series, University of Missouri-Columbia, Columbia, MO, 1999

FMI, Basel, Switzerland, 1999

Seminar Series, University of Torino, Torino, Italy, 1999

University of California-Los Angeles Seminar Series, Los Angeles, CA, 2000

Seminar Series, Yale University School of Medicine, New Haven, CT, 2000

Molecular & Cellular Oncology Seminar, 2000

Oncology Seminar Series, DFCI, Harvard Medical School, Boston, MA, 2001

Seminar Series, Moffitt Cancer Center, University of South Florida, Tampa, FL, 2001

Stanford Angiogenesis Research Forum, Stanford University, Stanford, CA, 2001

University of Pennsylvania Seminar Series, Philadelphia, PA, 2002

The Cleveland Clinic Foundation, The Lerner Research Institute, Department of Cancer Biology Seminar Series, Cleveland, OH, 2002

Nanotechnology Symposium, Rice University, Houston, TX, 2003

Molecular Targets NCI Workshop, Philadelphia, PA, 2003

National Cancer Institute Seminar Series, Frederick, MD, 2003

The Vanderbilt-Ingram Cancer Center, Nashville, TN, 2003

Johns Hopkins Medical Institute, Baltimore, MD, 2003

Universitat de Barcelona, Barcelona, Spain, 2003

University of California-San Francisco, San Francisco, CA, 2003

Baylor Gene Therapy Seminar Series, Houston, TX, 2004

Oncology Society, Rochester, MN, 2004

Nanohealth Summit, Houston, TX, 2004

NCI Seminar Series, Immunotherapy, 2004

Vascular Biology Seminar Series, Boston, MA, 02/04

Vari Seminar Series, Grand Rapids, Michigan, 03/04

Baylor College of Medicine Gene Therapy Seminar Series, 05/04

Van Andel Research Institute Seminar Series, Grand Rapids, MI, 08/04

Winship Cancer Institute, Emory University School of Medicine, Atlanta, GA, 08/04

Workshop on Biomedical Sensing and Imaging to the Nano-scale, Texas A&M University, College Station, TX, 10/04

Cancer Biology & Genetic Seminar, Memorial Sloan-Kettering Cancer Center Institute, New York, NY, 12/04

XXXV International Congress of Physiological Sciences Congress Symposium, San Diego, CA, 04/05

Henderson Research Centre Seminar, Hamilton, Canada, 04/05

Anti-Angiogenesis in Oncology Seminar, Pfizer Global Research and Development Seminar, San Diego, CA, 04/05

University of Michigan Life Sciences Institute Fourth Annual Symposium, Cancer Insights: Molecules to Medicine, Ann Arbor, MI, 05/05

Cancer Center Seminar Series, The City of Hope Comprehensive Cancer Center and Beckman Research Institute of the City of Hope, Duarte, CA, 06/05

Center for Cell Biology & Cancer Research, Albany Medical College, Albany, NY, 09/05

Boston Children's Hospital/Harvard Medical School, Boston, MA, 09/05

University of Michigan, Cancer Focus Group, Ann Arbor, MI, 10/05

Massachusetts Institute of Technology, Cambridge, MA, 03/06

Winship Cancer Institute, Emory University School of Medicine, Atlanta, GA, 04/06

PMT Distinguished Seminar Speaker, University of North Carolina, Chapel Hill, NC, 05/06

#### **Lectureships and Visiting Professorships**

Angiogenesis Course, University of Nebraska-Lincoln, Lincoln, NE, 2000

2<sup>nd</sup> International Symposium in Gene Therapy, Institute of Life Science of Yonsei University, Seoul, Korea, 2001

Cold Spring Harbor, "Vector Targeting Strategies" New York, NY, 2001

#### **Other Presentations at State and Local Conferences**

N/A

#### **PROFESSIONAL MEMBERSHIPS/ACTIVITIES**

##### **Professional Society Activities, with Offices Held**

##### **National and International**

Member, European Academy of Sciences

Member, American Society for Biochemistry and Molecular Biology (ASBMB), 2003

Member, Federation of American Societies for Experimental Biology (FASEB), 2003

Member, American Association for Cancer Research (AACR)

Member, American Association for the Advancement of Science

Member, American Society for Cell Biology

Member, PanAmerican Association for Biological Sciences

Member, American Society for Cancer Research

Member, American Society of Gene Therapy

Member, Society for Molecular Imaging

**Local/state**

N/A

**OTHER**

**Guest Lecturers hosted:**

Dr. Linda Shapiro, Associate Professor, St. Jude's Children's Hospital, Memphis, TN, Genitourinary Oncology Research Seminar Series, 10/00

Dr. Rubin Tudor, Associate Professor of Pathology, Johns Hopkins University, Baltimore, MD, Research Seminar Series, 9/01

Dr. Neil Pellis, Director of Research, Johnson's Space Center, NASA Houston, TX, Research Seminar Series, 9/01

Dr. Bruce Zetter, Professor of Cancer Biology, Harvard Medical School, Children's Hospital, Boston, MA, Genitourinary Oncology Research Seminar Series, 10/01

Dr. Steven K. Libutti, Senior Investigator, Surgery Branch, NCI, Bethesda, MD, Blaffer/Keck Seminar Series in Virology and Gene Therapy, 10/01

Dr. E. Helene Sage, Director, Division of Basic Science, The Hope Heart Institute, Seattle, WA, Genitourinary Oncology Research Seminar Series, 11/01

Dr. Donald McDonald, Professor of Anatomy, Cardiovascular Research Institute, University of California, San Francisco, CA, Genitourinary Oncology Research Seminar Series, 12/01

Dr. David A. Cheresh, Professor, Departments of Immunology and Vascular Biology, The Scripps Research Institute, La Jolla, CA, Genitourinary Oncology Research Seminar Series, 01/02

Dr. Houston Miller and Dr. Glaucio Souza, George Washington University, Washington, DC, Genitourinary Oncology Research Seminar Series, 01/02

Dr. Richard C. Mulligan, Mallinckrodt Professor of Genetics, Department of Genetics, Harvard Medical School, Boston, MA, Blaffer/Keck Seminar Series in Virology and Gene Therapy, 04/02

Dr. Leonard A. Herzenberg, Professor of Genetics, Emeritus, Department of Genetics, Stanford University School of Medicine, Stanford, CA, Blaffer/Keck Seminar Series in Virology and Gene Therapy, 06/02

Dr. Leonore A. Herzenberg, Professor of Research, Department of Genetics, Stanford University School of Medicine, Stanford, CA, Genitourinary Oncology Research Seminar Series, 06/02

Dr. Sergio Lira, Director, Department of Immunology, Schering-Plough Research Institute, Kenilworth, NJ, Department of Cancer Biology Seminar Series, 06/02

Dr. Raghu Kalluri, Associate Professor, Beth Israel-Deaconess, Harvard Medical School, Boston, MA, 9/02

Dr. Luisa Villa, Director, Department of Virology, The Ludwig Institute for Cancer Research, Brazil, 10/03

Dr. Luiz V. Rizzo, Associate Professor, The Heart Institute, University of São Paulo, Brazil, 10/03

Dr. Lisa Coussens, Associate Professor, University of California/San Francisco, San Francisco, CA, 10/03

Dr. Pierre-Olivier Couraud, Professor, ISERM, France, 11/03

Dr. Kevin Burgess, Professor, Texas A & M University, College Station, TX, 02/04

Dr. John Reed, President and CEO, The Burnham Institute, La Jolla, CA, 03/04

Dr. Kristina Vuori, Deputy Director, The Burnham Institute, La Jolla, CA, 03/04

Dr. Gilbert D. Loria Masis, Professor, University of Costa Rica, Department of Virology, School of Microbiology, San Jose, Costa Rica, 04/04

Dr. Amy Lee, Associate Director of Basic Research, USC/Norris Cancer Center, Los Angeles, CA, 05/04

Dr. Ricardo R. Brentani, President and CEO, The Ludwig Institute, São Paulo, Brazil, 06/04

Dr. Emmanuel Dias Neto, Researcher and Deputy-director of the Laboratory of Neurosciences, Instituto de Psiquiatria - Faculdade de Medicina - Univ. de São Paulo, 07/04

Dr. Lu Shan, Chemical Engineer, Dept. of Chemical Engineering, Stanford University, Stanford, CA, 07/04

Dr. Ricardo R. Brentani, President and CEO, The Ludwig Institute, São Paulo, Brazil, 07/04

Dr. Fabio C.L. Almeida, Associate Professor/Professor Adjunct, Federal University, Rio de Janeiro, Brazil, 09/04

Dr. Theresa Mary Allen, Professor, Department of Pharmacology, University of Alberta School of Medicine, Edmonton, Alberta, Canada, 03/05

Dr. Tong-Young Lee, Postdoctoral Fellow, Institute of Pathology, College of Medicine, National Taiwan University, Taipei, Taiwan, 04/05

Dr. Claudio A. Joazeiro, Group Leader, The Genomics Institute of the Novartis Foundation, San Diego, CA, 04/05

Dr. Keith L. March, Associate Professor, Department of Cellular and Integrative Physiology, Indiana University, Director, Indiana Center for Vascular Biology and Medicine, Associate Professor, Department of Biomedical Engineering, Purdue University, Indianapolis, IN, 06/05

Dr. Thomas C. Killian, Assistant Professor, Department of Physics and Astronomy, Rice University, Houston, TX, 9/05

Dr. Rebecca Rae Richards-Kortum, Professor, Department of Bioengineering, Rice University, Houston, TX, 10/05

Drs. Brian Freeman and Andrew Perlman, Great Point Ventures, Boston, MA, 10/05

Drs. Henrietta Kulaga and Jon Mogford, DARPA, Arlington, VA, 10/05

Dr. Paul J. Simmons, NHMRC Senior Research Fellow, Program Head in Stem Cell Biology, Director, Adult Stem Cell Platform, Peter MacCallum Cancer Centre, Stem Cell Centre, Melbourne, Australia, 12/05

Dr. Angela Papageorgiou, M.D. Anderson Cancer Center, Department of Cancer Biology, Houston, TX, 12/05

Alessandro Kelien Lee, Laboratory of Molecular Angiogenesis, IRCC – Institute of Cancer Research and Treatment, Candiolo (TO), Italy

Co-hosted, Brain Tumor Center Special Seminar invited speaker, Dr. Mark Noble, University of Rochester, School of Medicine and Dentistry, Rochester, NY, 12/05

Co-hosted, John H. Blaffer Lecture Series invited speaker, Dr. Robert Benezra, Memorial Sloan-Kettering Cancer Center, New York, NY, 12/05

Kris C. Wood, Ph.D. Candidate, Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA, 03/06

Dr. Chae-Ok Yun, Associate Professor, Institute for Cancer Research, Yonsei Cancer Center, Yonsei University of College of Medicine, Seoul, Korea, 03/06

Co-hosted, ERO Blaffer Visiting Professorship Lecture invited speaker, Dr. Richard Kolesnick, Head of the Laboratory of Signal Transduction of the Sloan-Kettering Institute, New York, NY, 03/06

Co-hosted, Dr. Alberto Bardelli, Associate Professor, Department of Oncological Sciences, University of Torino, School of Medicine, Torino, Italy, 03/06

Dr. Russell L. Finley, Jr., Associate Professor, Center for Molecular Medicine and Genetics, and Department of Biochemistry and Molecular Biology, Wayne State University School of Medicine, Detroit, MI, 03/06

Dr. Erik Henke, Research Fellow in Dr. Robert Benezra's Laboratory, Department of Cancer Biology and Genetics, Memorial Sloan-Kettering Cancer Center, New York, NY, 05/06

Dr. Masanori Soto, Staff Scientist, Biology Division, National Cancer Center Research Institute, Tokyo, Japan, 05/06

Dr. Satoshi Kawaguichi, Department of Orthopedic Surgery, Sapporo Medical University School of Medicine, Sapporo, Japan, 06/06

Dr. Angelo Corti, Head of Tumor Biology and Vascular Targeting Unit, DIBIT-San Raffaele H Scientific Institute, Milan, Italy, 08/06

Dr. Robin L. Anderson, Head, Cancer Biology Laboratory, Peter MacCallum Cancer Centre, Melbourne, Australia, 08/06

Eric Berger, Science Writer, Houston Chronicle, 08/06

Dr. Jaesung Kim, Institute for Cancer Research, Yonsei Cancer Center, Yonsei University College of Medicine, Republic of Korea, Seoul, Korea, 09/06

Laura Lattanzio, Institute for Cancer Research and Treatment, University of Turin Medical School, Candiolo, Italy, 09/06

Dr. Randy J. Seeley, PhD, Department of Psychiatry, Genome Research Institute, University of Cincinnati, Cincinnati, OH, 04/07

Dr. E. Helene Sage, PhD, Member and Director, Hope Heart Program, Benaroya Research Institute at Virginia Mason, Seattle, WA, 05/07



## **Exhibit 2**

# Hybridoma-free generation of monoclonal antibodies

Renata Pasqualini\* and Wadih Arap\*

University of Texas M. D. Anderson Cancer Center, Houston, TX 77030

Communicated by Richard L. Sidman, Harvard Medical School, Boston, MA, September 11, 2003 (received for review August 11, 2003)

Production of monoclonal antibodies requires immortalization of splenocytes by somatic fusion to a myeloma cell line partner (hybridomas). Although hybridomas can be immortal, they may depend on a feeder cell layer and may be genetically unstable. Since the inception of hybridoma technology, efforts to improve efficiency and stability of monoclonal antibody-producing cell lines have not brought about substantial progress. Moreover, suitable human multiple myeloma-derived cell lines for the production of human antibodies have been very difficult to develop. Here we report a strategy that greatly simplifies the generation of antibodies and eliminates the need for hybridomas. We show that splenocytes derived from transgenic mice harboring a mutant temperature-sensitive simian virus 40 large tumor antigen under the control of a mouse major histocompatibility promoter are conditionally immortal at permissive temperatures and produce monoclonal antibodies. This simple approach may become a method of choice for generation and production of both polyclonal and monoclonal antibodies with advantages in high-throughput discovery and antibody-based immunotherapy.

Monoclonal antibodies are proteins with such exquisite specificity and sensitivity in their reactions with specific sites on target molecules that they have become reagents of central importance in modern biological research, including the analysis and treatment of human disease. However, more than a quarter century after their introduction, monoclonal antibodies are still produced only by somatic cell hybrid clones of splenocytes fused to multiple myeloma-derived cells (1). These “hybridomas” can produce monoclonal antibodies for years, but production involves a labor-intensive multistep process limited by the constant risk of contamination, often requires feeder cells, and may be genetically unstable (2). Despite later developments, such as phage-display technology for *in vitro* generation of monoclonal antibodies (3, 4), chimerization or humanization strategies (5), and human myeloma cell lines suitable for hybridoma formation (6), a simple and effective strategy for generating monoclonal antibody-producing immortal cells would represent a major advance.

Here we show that splenocytes derived from transgenic mice harboring a mutant temperature-sensitive (ts) simian virus 40 large tumor antigen under the control of a mouse major histocompatibility promoter (*H-2K<sup>b</sup>-tsA58* mouse or ImmortoMouse; ref. 7) are conditionally immortal at permissive temperatures and produce monoclonal antibodies.

## Materials and Methods

**Immunization.** *H-2K<sup>b</sup>-tsA58* mice (Charles River Breeding Laboratories) were immunized with filamentous fd-tet phage (8) every other week for 12 weeks. In brief, a phage preparation containing  $10^7$  transducing units/ $\mu$ l (total volume = 1 ml) was administered by four routes (i.v., i.p., intradermally, and s.c.). Mice were bled after each boost and ELISA was used to monitor anti-phage antibody titers in the serum. Animal experimentation involved standard established procedures reviewed and approved by the Institutional Animal Care and Use Committee from the University of Texas M. D. Anderson Cancer Center.

**Derivation of Immortal Splenocytes.** Mice were killed and their spleens were collected in DMEM. Cells were released by gentle pressure applied to the capsule of the organ, which was placed between two frosted glass slides. Next, splenocytes were resuspended in 15 ml of hybridoma medium containing 10% controlled-process serum replacement (Sigma-Aldrich, catalog no. C-0786), a quality-controlled bovine plasma that supports hybridoma growth, and hybridoma-enhancing supplements (Hybrimax; Sigma-Aldrich, catalog no. H-2900) to facilitate cell growth at low-density plating. Tissue debris were gravity-cleared by serially transferring spleen-derived cells to fresh 15-ml conic plastic tubes. A total of  $2 \times 10^8$  cells were distributed in 6-, 24-, and 96-well plates and cultured at 33°C. The culture medium was changed completely three times during 2–3 weeks. Clones were observed in >90% of the wells after 3 weeks. For the next 2 months, the plates were monitored, and 100  $\mu$ l of fresh medium was added to each well every 3 weeks. Positive wells were subcloned by limiting dilution (2); some of the clones were also expanded to 24-well and 96-well plates to monitor reactivity after a long term in culture. We minimized or avoided the problem of splenocyte “clumping” by carefully suspending the cells in each well and by using serum-free medium. After counting and plating the suspensions at 0.1–0.5 cells per well, we systematically inspected each 96-well plate visually under the microscope.

## Screening and Generation of Clonal Antibody-Producing Splenocytes.

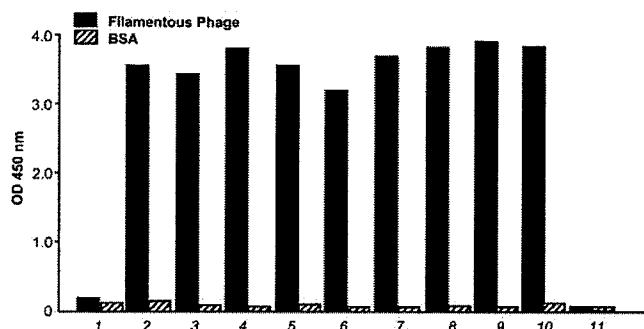
ELISA against filamentous phage and against recombinant phage capsid pIII protein was performed as described (2). BSA, hybridoma medium alone, preimmune serum, and secondary antibody served as negative controls. Immune polyclonal serum and anti-phage antibody served as positive controls. Antibodies were plated directly from culture supernatants. Cells from the positive wells were subcloned by limiting dilution to obtain monoclonal lines. Subclones emerging after 2 months were tested against the entire phage particle and the pIII phage capsid protein by using ELISA. Reactivity was monitored in an ELISA reader.

**Western Blot Analysis.** Filamentous fd-tet phage ( $10^9$  transducing units/lane) were boiled, resolved by a gradient 4–20% SDS/PAGE (Invitrogen) and electrotransferred to Immuno-Blot polyvinylidene fluoride membrane (Bio-Rad). The membrane was divided into strips, blocked by 5% nonfat milk in PBS for 1 h at room temperature followed by a single wash with PBS containing 0.1% Tween 20. Strips were incubated with pre-immune serum (1:1,000), postimmune serum (1:1,000), anti-fd-tet phage (Sigma-Aldrich), supernatants containing anti-phage IgGs secreted from immortal splenocyte clones, or cell culture media alone for 2 h at room temperature. After three washes, a peroxidase-conjugated secondary antibody (Bio-Rad) was added to the strips and incubated for 1 h at room temperature. Strips were washed three times, and the

Abbreviation: ts, temperature-sensitive.

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**Fig. 1.** Screening and validation of antibodies obtained from *H-2K<sup>b</sup>-tsA58* transgenic mouse-derived immortal splenocytes. Cells were released and resuspended in hybridoma medium (see *Materials and Methods* for details). ELISA against filamentous phage (fd-tet) and against recombinant phage capsid pIII protein was performed as described (2). BSA, hybridoma medium alone, preimmune serum, and secondary antibody served as negative controls. Immune polyclonal serum and anti-phage antibody served as positive controls. Antibodies were plated directly from culture supernatants and tested as follows: 1, preimmune serum at 1:400 dilution; 2, postimmune serum at 1:3,200 dilution; 3–10, supernatants derived different 6-, 24-, and 96-well plates, 2 weeks after plating of the spleen; 11, cultured medium alone as a negative control. Bars correspond to the mean. Standard errors of the mean were <1% of the mean.

reactivity was detected by enhanced chemiluminescence (Amersham Biosciences).

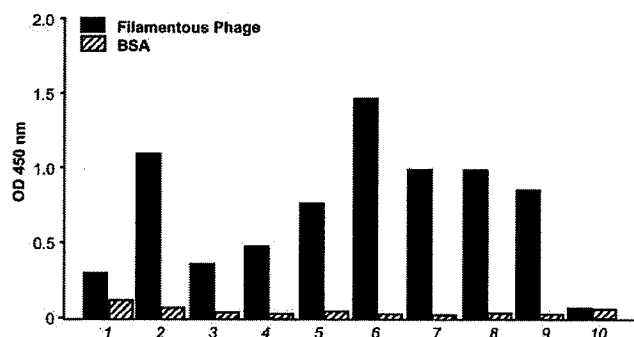
## Results and Discussion

Many different types of conditionally immortal cell lines have been derived from *H-2K<sup>b</sup>-tsA58* mice (7, 9–12). Surprisingly, this well established mouse model has not been exploited in applications for the generation of monoclonal antibody-producing cells.

As proof of concept, *H-2K<sup>b</sup>-tsA58* mice were immunized with a defined antigen (filamentous phage; ref. 8), and anti-phage antibody titers in the serum were monitored by ELISA. Anti-phage IgG titers reached high levels ( $OD_{450} > 3$  at 1:3,200 dilution, compared with  $<0.1$  for preimmune serum) 7 days after a final boost (Fig. 1). Further testing of serial dilutions revealed that IgG titers against phage were on average  $\approx 1:6,400$ ; moreover, the serum titers against the pIII protein (coated at  $10 \mu\text{g}$  per well) were on average  $\approx 1:1,600$  (data not shown). Mouse spleens were collected and cell suspensions were prepared in DMEM. The cells were distributed in 96-well plates and cultured at  $33^\circ\text{C}$ . The culture medium was changed completely three times during 2–3 weeks. Clones were observed in  $>90\%$  of the wells after 3 weeks. To detect antibody reactivity, ELISA was performed with supernatants in microtiter well plates coated with phage particles. Up to 58% of the wells tested were positive for IgG reactivity against phage.

We observed that splenocytes were healthy despite low cell density and yielded robust levels of reactivity in supernatants from most of the wells. To obtain monoclonal lines, cells from positive wells were cloned by limiting dilution, and most clones remained positive. Subcloning of monoclonal lines was repeated twice, and virtually all the resulting clones were positive, providing strong evidence that the lines generated were indeed derived from single clones.

Clones emerging after 4–8 weeks were tested by ELISA against the phage particles and against the minor phage capsid protein (pIII). Again, most positive clones continued to react when expanded from 96-well to 24-well plates or after freeze and thaw (Fig. 2). Strong reactivity was observed against intact phage, and some clones also reacted against recombinant pIII

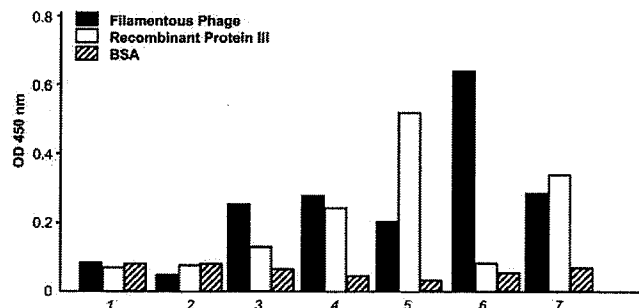


**Fig. 2.** Characterization of *H-2K<sup>b</sup>-tsA58* transgenic mouse-derived immortal splenocytes producing anti-phage antibodies. Clones 1–3 correspond to clones that underwent freeze–thaw. All thawed clones recovered and remained positive. Clones 4–9 correspond to different wells expanded from 96-well plates to 24-well plates and cultured for 6 weeks; 10 indicates cultured medium alone as a negative control. Other controls included were pre- and postimmune sera. Bars correspond to the mean. Standard errors of the mean were <1% of the mean.

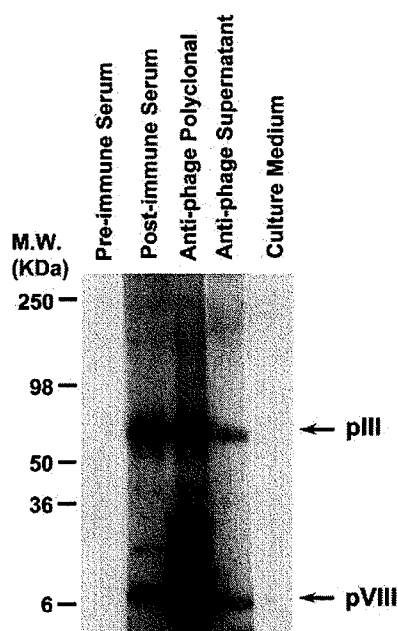
fusion protein (Fig. 3). Original plates and clones at all stages were kept in culture for up to 3 months.

To determine whether antibodies screened by ELISA can recognize specific proteins in Western blots, we evaluated supernatants from *H-2K<sup>b</sup>-tsA58* transgenic mouse-derived immortal splenocytes against the pIII and pVIII phage capsid proteins by resolving a filamentous phage preparation by SDS/PAGE. Polyvinylidene fluoride membranes containing phage proteins were incubated with preimmune serum, postimmune serum, a commercially available anti-phage, or supernatants containing anti-phage IgGs secreted from immortal splenocyte clones. Cell culture medium alone was used as an additional negative control. Antibodies reacting specifically with bands corresponding to the pIII and the pVIII phage capsid proteins were detected in the supernatants from *H-2K<sup>b</sup>-tsA58* transgenic mouse-derived immortal splenocytes (Fig. 4). This result shows that antibodies produced by the methodology described here can also be used in applications such as immunoblotting (Fig. 4) or fluorescence-activated cell sorting of cell surface antigens (data not shown).

We conclude that splenocytes from *H-2K<sup>b</sup>-tsA58* transgenic mice can yield high titers of IgG against defined antigens. This cell culture system ensures a reliable and reproducible source of



**Fig. 3.** Evaluation of *H-2K<sup>b</sup>-tsA58* transgenic mouse-derived immortal splenocytes producing antibodies against intact phage particles and against the pIII phage capsid protein. 1, culture medium, negative control; 2, preimmune serum; 3–7, supernatants derived different monoclonal lines after 8 weeks in culture. 4, 5, and 7 react strongly with the pIII protein and, at this concentration, also react with intact filamentous phage particles. Bars correspond to the mean. Standard errors of the mean were <1% of the mean.



**Fig. 4.** Reactivity of supernatants from *H-2K<sup>b</sup>-tsA58* transgenic mouse-derived immortal splenocytes producing antibodies against phage proteins. Reactivity was evaluated after incubation with preimmune serum, postimmune serum, an anti-phage antibody, or supernatants containing anti-phage IgGs secreted from immortal splenocyte clones, as indicated. Cell culture medium alone served as an additional negative control. Antibodies reacting specifically against pIII and pVIII phage capsid proteins (arrows) were detected in supernatants from *H-2K<sup>b</sup>-tsA58* transgenic mouse-derived immortal splenocytes.

monoclonal antibodies and eliminates the need for hybridoma generation.

Several advantages of this methodology merit further comment. First, the antibody-synthesizing cells are stable for at

least several months in culture, tolerate limiting dilution cloning, and survive freeze-thaw without loss or inactivation of antibody production. We have frozen polyclonal populations and recovered viable clones secreting a given IgG (data not shown). Second, immortal clones grow slowly at 33°C and are genetically stable, allowing for timely processing of numerous samples (and, logically, the possibility of obtaining "rare" antibodies). *H-2K<sup>b</sup>-tsA58*-derived splenocytes enable the production of large amounts of specific polyclonal IgGs from wells containing clones that have been cultured long term. In contrast, hybridomas are problematic because, in a random mixture of clones, nonsecreting clones generally will overtake the secreting ones. Preliminary data suggest that the proliferation rate between IgG secreting and nonsecreting splenocytes derived from an *H-2K<sup>b</sup>-tsA58* transgenic mouse is similar (unpublished observations). Third, *in vitro* immunization is enhanced through the presence of other spleen-derived immortal cell types, such as macrophages, dendritic cells, and fibroblasts, that facilitate antibody production (2), whereas *ex vivo* immunization is inefficient with mortal splenocytes or hybridomas. Given the recent restrictions placed on ascites production, this new technology favors convenient large-scale manufacture of antibodies *ex vivo*. Fourth, crossing *H-2K<sup>b</sup>-tsA58* mice with mice expressing the genetic complement for human antibody production (13–15) will also enable production of human monoclonal antibodies.

In summary, the strategy described here is likely to replace hybridoma generation and streamline the production of mouse and human antibodies, with profound and immediate scientific and medical benefits.

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1. Köhler, G. & Milstein, C. (1975) *Nature* **256**, 495–497.
2. Harlow, E. & Lane, D. (1998) *Antibodies: A Laboratory Manual* (Cold Spring Harbor Lab. Press, Plainview, NY).
3. Winter, G., Griffiths, A. D., Hawkins, R. E. & Hoogenboom, H. R. (1994) *Annu. Rev. Immunol.* **12**, 433–455.
4. Barbas, C. F., III, Burton, D. R., Scott, J. K. & Silverman, G. J. (2000) *Phage Display: A Laboratory Manual* (Cold Spring Harbor Lab. Press, Plainview, NY).
5. Winter, G. & Milstein, C. (1991) *Nature* **349**, 293–299.
6. Karpas, A., Dremucheva, A. & Czepulkowski, B. H. (2001) *Proc. Natl. Acad. Sci. USA* **98**, 1799–1804.
7. Jat, P. S., Noble, M. D., Ataliotis, P., Tanaka, Y., Yannoutsos, N., Larsen, L. & Kioussis, D. (1991) *Proc. Natl. Acad. Sci. USA* **88**, 5096–5100.
8. Zacher, A. N., III, Stock, C. A., Golden, J. W., II & Smith, G. P. (1980) *Gene* **9**, 127–132.
9. Whitehead, R. H., Van Eeden, P. E., Noble, M. D., Ataliotis, P. & Jat, P. S. (1993) *Proc. Natl. Acad. Sci. USA* **90**, 587–591.
10. Chambers, T., Owens, J., Hattersly, G., Jat, P. & Noble, M. D. (1993) *Proc. Natl. Acad. Sci. USA* **90**, 5578–5582.
11. Holley, M. C., Nishida, Y. & Grix, N. (1997) *Int. J. Dev. Neurosci.* **15**, 541–552.
12. Langley, R. R., Ramirez, K. M., Tsan, R. Z., Van Arsdall, M., Nilsson, M. B. & Fidler, I. J. (2003) *Cancer Res.* **63**, 2971–2976.
13. Mendez, M. J., Green, L. L., Corvalan, J. R., Jia, X. C., Maynard-Currie, C. E., Yang, X. D., Gallo, M. L., Louie, D. M., Lee, D. V., Erickson, K. L., *et al.* (1997) *Nat. Genet.* **15**, 146–156.
14. Lonberg, N., Taylor, L. D., Harding, F. A., Trounstein, M., Higgins, K. M., Schramm, S. R., Kuo, C. C., Mashayekh, R., Wymore, K., McCabe, J. G., *et al.* (1994) *Nature* **368**, 856–859.
15. Kuroiwa, Y., Tomizuka, K., Shinohara, T., Kazuki, Y., Yoshida, H., Ohguma, A., Yamamoto, T., Tanaka, S., Oshimura, M. & Ishida, I. (2000) *Nat. Biotechnol.* **18**, 1086–1090.

## **Exhibit 3**

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Request for opinion on manuscript by:

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Title: Hybridoma-free generation of monoclonal antibodies

Ms. No.

03-5834

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☐ Yes

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2. Is this contribution of sufficient general interest to justify publication in PNAS rather than a specialty journal?

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☐ Yes

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4. Is this paper clearly written for a diverse audience of scientists?

☒ Yes

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5. Are the procedures described sufficiently well that the work can be repeated?

☐ Yes

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"Salsbury, Daniel" <DSalsbur@nas.edu> on 11/13/2003 08:37:35 AM

To: <rpasqual@mdanderson.org>  
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Dr. Pasqualini,

The Editorial Board has accepted your paper for publication in PNAS.

We are forwarding the latest round of comments from the referee appointed by the Board. These comments are for your consideration and we encourage you to incorporate any changes on your proofs. We appreciate your patience and willingness to respond to the referee's previous concerns.

Sincerely,  
Daniel Salsbury  
PNAS

Referee's comments:

These authors insist that they are immortalizing all of the spleen cells and that 58% of the clones derived from those cells are making antibody to the immunizing antigen. Usually 30% of the spleen cells are B cells, but even if it were 50%, that would mean that virtually every single B cell in the spleen from a mouse with a modest circulating antibody titer is making antibody to a single antigen and that there are virtually no B cells in that spleen making antibody to the many OTHER ANTIGENS IN THE ENVIRONMENT. I know of no precedence for that. The authors response to this question is to answer that they have seen fusions in which 50% of the wells are positive. 50% is very rare if there is one hybrid/well to start with. But that is the point. In a fusion there is selection for the blasting B cells that arise as a result of antigen stimulation and most the rest of the B cells and the other spleen cells do not form viable hybrids. That was the point that Kohler and Milstein made in their first paper. In any case it is irrelevant since no one would claim that in a fusion all of the spleen cells give rise to viable clones of B cells.

I do not understand why the authors will not accept that what they are saying is surprising. Furthermore, I do not understand why they do not accept that this is so unusual and that they must in the discussion explicitly state that this is what they are saying and explain how 58% of their cloned spleen cells are making antibody to their immunizing antigen. If they really believe this, then I would require that they absorb the serum from the immunized mice with their antigen and show that there is no IgG left in the serum.

I still believe that their result is best explained by the selective outgrowth of specific antibody forming clones. Even though I still believe that this could be due to persistent antigen, if they do not like that explanation, why not think about persistent cells presenting antigen.

Alternatively, it is I guess possible that even at the non-permissive temperature there is the outgrowth in vivo of one or a few clones to the immunizing antigen due to some inherent abnormality in these mice. Then they would see a monoclonal or oligoclonal gammopathy in the serum.

Irrespective

of the explanation, they must state that something has resulted in a mouse in which all of the B cells make antibody in response to the immunizing antigen and provide some possible explanations for this. If any of these explanations were true, it would make these mice and this technique even more valuable.

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Review:  
Man# 03-5634

The authors describe the use of mice that more or less ubiquitously express the SV40 large tumor antigen in cells grown at 33°C to immortalize antibody forming B cells from the spleens of immunized mice. Although it is surprising that these mice have not been used to immortalize B cells to get monoclonal antibodies, I am not aware of anyone reporting their use for that purpose. The authors are correct in saying that there has been little progress made in the hybridoma technology over many years. If these mice could be used routinely to make such antibodies, it could advance the technology. However, the authors need to provide us with some more information, much of which they probably already have, to support the claims that they have made. If in fact they can do this, then it would certainly be of general interest and the overall quality of paper would be sufficient to merit publication in the Proceedings.

There are a number of things that have to be clarified if this approach is to be used by others:

1. Phage are very immunogenic and in these experiments they have immunized with large amounts of phage 6 times by 4 different routes. My guess is that the serum titers are really in the 500,000 to a million range, or even higher. They should do sufficient serum dilutions to get a real titer and tell us on the bottom of page 6. This would allow us to put their findings in perspective for common less immunogenic antigens. In addition, on page 5 top, they should tell us how many cells were plated in each well to get 90% of the wells positive and what % of the wells were positive after limiting dilution. If these mice are really making very high titers of antibody compared to mice immunized with more common antigens, then the apparent ease of getting antibody forming clones would not apply to most other antigens. Antibody producing cells in mice immunized with less immunogenic antigens are relatively rare requiring similar screening to that required to identify hybridomas. For example, if only 1 in 10,000 B cells were making the desired antibody when the spleen was harvested, then one would have to screen that many more wells to find positive wells after the initial plating and the frequency after limiting dilution would be much lower. In such cases it would be very time consuming and expensive to do such screening, just as it is for screening hybridomas. As Kohler and Milstein pointed out, the hybridoma technology enriches for B cells, while this process might immortalize T cells and perhaps others as well, so it may turn out that the screening problems would not be that different from making hybridomas. Then one would have to do sib selection or some other enrichment like FACS to get the positive cells. I do not think this is adequately considered or discussed here and the only way to figure out if this will be a problem is to determine the real titer of serum and present the results of their limiting dilution.

2. On page 5 top, what is CSPR and which hybridoma enhancing supplements were used? It might not be possible for others to use this techniques without that information.

3. We are told that serum titers are for IgG on the bottom of page 6 and we are told that they can recover IgG producing clones from freezings on the bottom of page 8, but since most IgMs are low affinity, it is important to know roughly what the ratio of IgM and IgG clones is. How did they screen the limiting dilution?

4. I am also concerned about their "limited dilution cloning". B cells are very sticky and usually grow in clumps. The western in figure 4 shows what I think is a putative clone reacting with both p3 and p8, suggesting that it is not a clone. This needs clarification.



5. On page 9, they suggest that it will be easy to make large amounts of monoclonal antibody from clones of these B cells. Have they tried to do this and what sorts of amounts of antibody do they get as they scale up? In fact, this has always been a problem with Abelson or EBV transformed cells making monoclonal antibodies and they should either try to do this and tell us the amount of antibody/ $10^6$  cells/24 hours or not make this claim. My guess is that it will be low compared to a hybridoma, but if it is really low, this would to some degree cancel out the gains made.

6. What happens if one shifts long-term clones to 37 °C.

In conclusion, this could be a major advance but that will depend on whether it can be carried out in a practical manner with ordinary antigens and if stable clones produce reasonable amounts of antigen.